SELECTED WATER RESOURCES ABSTRACTS

VOLUME 7, NUMBER 21
NOVEMBER 1, 1974

W74-10901 -- W74-11450

OFFICE OF WATER RESEARCH AND TECHNOLOGY

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WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center,
Office of Water Research and Technology, U.S. Department of the Interior

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W74-10901 -- W74-11450

The Secretary of the U. S. Department of the Interior has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1978.

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into ten fields and sixty groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Research and Technology and other Federal water resource agencies with which the

Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Research and Technology
U.S. Department of the Interior
Washington, D. C. 20240

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01 NATURE OF WATER
Includes the following Groups: Properties; Aqueous Solutions and Suspensions

02 WATER CYCLE
Includes the following Groups: General; Precipitation; Snow, Ice, and Frost; Evaporation and Transpiration; Streamflow and Runoff; Groundwater; Water in Soils; Lakes; Water in Plants; Erosion and Sedimentation; Chemical Processes; Estuaries.

03 WATER SUPPLY AUGMENTATION AND CONSERVATION
Includes the following Groups: Saline Water Conversion; Water Yield Improvement; Use of Water of Impaired Quality; Conservation in Domestic and Municipal Use; Conservation in Industry; Conservation in Agriculture.

04 WATER QUANTITY MANAGEMENT AND CONTROL
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05 WATER QUALITY MANAGEMENT AND PROTECTION
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06 WATER RESOURCES PLANNING
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07 RESOURCES DATA
Includes the following Groups: Network Design; Data Acquisition; Evaluation, Processing and Publication.

08 ENGINEERING WORKS
Includes the following Groups: Structures; Hydraulics; Hydraulic Machinery; Soil Mechanics; Rock Mechanics and Geology; Concrete; Materials; Rapid Excavation; Fisheries Engineering.

09 MANPOWER, GRANTS, AND FACILITIES
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ACCESSION NUMBER INDEX

ABSTRACT SOURCES

SELECTED WATER RESOURCES ABSTRACTS

1. NATURE OF WATER

1A. Properties

AN EMPIRICAL INTERMOLECULAR POTENTIAL ENERGY FUNCTION FOR WATER,
Cornell Univ., Ithaca, N.Y. Dept. of Chemistry.
For primary bibliographic entry see Field 2K.
W74-11106

2. WATER CYCLE

2A. General

THE DETERMINATION OF ZONES OF INTENSE CONTRIBUTION TO STREAM FLOW AS RELATED TO THE CONCEPT OF PARTIAL AREA CONTRIBUTIONS,
Maryland Univ., College Park. Dept. of Civil Engineering.
V. C. Bissell, and R. M. Ragan.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 623, $5.50 in paper copy, $2.25 in microfiche. Maryland Water Resources Research Center, College Park, Technical Report No 21 (1974). 188 p, 46 fig, 35 tab, 16 ref, 5 append. OWRR B-005-MD(1). 14-01-0001-1909.

Descriptors: *Storm runoff, *Distribution patterns, Areal, Forest watersheds, New England, Rainfall intensity, *Precipitation intensity, *Rainfall disposition, *Channel flow, Surface runoff, *Rainfall-runoff relationships.

An extensive field investigation was conducted at the University of Vermont in summer of 1966 to examine the physical processes contributing to areal and temporal distribution patterns of storm runoff from forested New England watersheds. The present study was directed at an extension of the limited conclusions of the earlier investigators by consolidation of several phases of independently collected data. The relative importance of such factors as precipitation intensity, duration, and volume in producing stormflow from isolated subareas was inspected. The source-wise distribution of lateral inflows to a selected stream channel reach was also monitored. Relative runoff contributions were evaluated during both storm and non-storm periods. The percent of rainfall returned to the channel as stormflow was found to be an order of magnitude greater from particular low-lying wet areas than from the entire area draining into the channel reach. It was found that these wet areas contributed a greater percentage of the lateral inflow to the reach during non-storm periods than during storm periods. The percent of rainfall returned as stormflow from the selected subareas during a storm showed a moderate dependence upon rainfall volume, while displaying little dependence upon storm intensity. The existence of active source areas for storm runoff was shown by the fact that over one-half the lateral inflow to the channel reach was contributed by subareas making up only 4.3% of the total area draining into the reach.
W74-10904

A FINITE ELEMENT APPROACH TO WATERSHED RUNOFF,
University Coll. of Swansea (Wales). Dept. of Civil Engineering.
C. Taylor, G. Al-Mashidani, and J. M. Davis.
Journal of Hydrology, Vol 21, No 3, p 231-246, 1974.

Descriptors: Model studies, *Simulation analysis, *Mathematical models, *Watershed management, *Runoff, *Algorithms, *Finite element analysis.

Watershed direct runoff problems are analyzed by a numerical finite element-based implicit recurrence relationship. The algorithm is shown in a two-dimensional form for the full momentum and continuity equations. It is presented unidimensionally for the kinematic wave theory. Because the whole domain is represented and solved as a single set of matrix equations, the advent of shocks for domains where appreciable changes in slope and/or resistance to flow occur is immediately recognizable. (Murphy-FIRL)
W74-10937

PIERRE PERRAULT: THE MAN AND HIS CONTRIBUTION TO MODERN HYDROLOGY,
Geological Survey, Raleigh, N.C.
R. L. Nace.
Water Resources Bulletin, Vol 10, No 4, p 633-647, August 1974. 16 ref.

Descriptors: *Hydrology, *History, *Hydrogeology, *Springs, Hydrologic cycle, Groundwater movement.

Pierre Perrault (1611-1680), was an amateur scientist and early hydrologist, a member of a bourgeois provincial family whose roots were in the Touraine region of France. One of six brothers, all characterized by brilliance and diversity, he was educated as a lawyer but turned to finance and rose to a high position under King Louis XIV. Owing to political naivete and financial imprudence, he fell into disgrace and went bankrupt. As an amateur scientist he wrote a book on the origin of springs. This book broke almost wholly with the traditional authoritarianism of 2,000 years' standing, and set hydrology on the modern path of observation and direct experiment. He developed the concept of the hydrological cycle, correctly accounting for the disposition of rainfall by evaporation, transpiration, groundwater recharge and runoff. Some of his ideas about specific processes were erroneous, but where he was wrong his errors were logically based. Much of his contribution to the foundation of scientific hydrology has been overlooked or distorted by historians and hydrologists. (Knapp-USGS)
W74-11206

USERS GUIDE FOR A U.S. GEOLOGICAL SURVEY RAINFALL-RUNOFF MODEL,
Geological Survey, Reston, Va.
C. W. Boning.
Open-file report 74-33, May 1974. 232 p, 2 fig, 2 tab, 2 ref.

Descriptors: *Mathematical models, *Computer programs, *Rainfall-runoff relationships, Streamflow forecasting, Runoff forecasting, Routing, Infiltration, Soil moisture, Synthetic hydrology, Simulation analysis.

The U.S. Geological Survey developed a rainfall-runoff model to synthesize flood discharges for small drainage areas. This report provides guidelines for the assembly, storage, and retrieval of data needed to use the model, and also provides descriptions and documentations of computer programs for model calibration and flood record synthesis. The model employs digital computer solutions of mathematical relations to approximate the hydrologic processes of infiltration, soil moisutre storage, and surface runoff routing. Constants and limits in the mathematical relations are determined automatically by an internal optimization procedure to calibrate the model to a specific drainage site. Recent modifications include the optimization of parameters in the surface runoff routing computations, and provisions for synthesizing flood runoff from small urban watersheds. (Knapp-USGS)
W74-11234

2B. Precipitation

THE DETERMINATION OF ZONES OF INTENSE CONTRIBUTION TO STREAM FLOW AS RELATED TO THE CONCEPT OF PARTIAL AREA CONTRIBUTIONS,
Maryland Univ., College Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2A.
W74-10904

A SCHEME FOR ASSESSING THE RELIABILITY OF INTERPOLATED RAINFALL ESTIMATES,
Birmingham Univ. (England). Dept. of Civil Engineering.
P. S. Kelway.
Journal of Hydrology, Vol 21, No 3, p 247-267, 1974. 5 fig, 9 tab, 8 ref.

Descriptors: Model studies, *Computer models, *Stimulation analysis, *Rainfall, Hydrologic cycle, Rain gages, Distribution patterns, *Forecasting, *Estimating, *Reliability.

Quantification of the significance of variables controlling the reliability of interpolated estimates of rainfall is attempted. Alternative ways of expressing the gauge network and rainfall distribution patterns in a form that may be used in estimating equations for assessing error in interpolated values are examined. A scheme is devised for obtaining equations analytically for any interpolation method used to derive information; the results of a study relevant to a specific analysis technique are shown. The purpose of the scheme is to enable confidence limits to be placed on interpolated output during computer processing of rainfall data. Comparisons may then be made between available analytical techniques, results being assessed under operational conditions. Once a user has selected a suitable method of analysis, the factors likely to control the accuracy of the information produced are monitored during processing and likely tolerance limits are given for output values. (Murphy-FIRL)
W74-10941

WARM FOG AREA SEEDING STUDIES,
Meteorology Research, Inc., Altadena, Calif.
For primary bibliographic entry see Field 3B.
W74-11032

CAUSES FOR PRECIPITATION INCREASES IN THE HILLS OF SOUTHERN ILLINOIS,
Illinois State Water Survey, Urbana.
D. M. A. Jones, F. A. Huff, and S. A. Changnon, Jr.
Report of Investigation 75, 1974. 36 p, 33 fig, 16 tab, 20 ref. NSF Grant GA-19494.

Descriptors: *Precipitation(Atmospheric), *Illinois, *Climatology, *Meteorology, Evapotranspiration, Nucleation, Clouds, Diurnal distribution, Winds, Topography, Seasonal, Rainfall, Weather patterns.
Identifiers: *Shawnee Hills(IL), Hill effect, Diurnal differences, Radar echoes.

Three major studies show that the hill enhancement of precipitation is the addition of moisture due to greater evapotranspiration from the forested hills and the convergent wind field created over the western hills caused by the configuration of the hills and valleys. Three methods differing in scale and time were used to delineate the hill anomaly and to determine the reasons for it. First, a series of climatic studies of precipitation distribution considering daily, monthly, and seasonal data for comparison of hill and flatland stations were performed during 1960-1963. Second, a 5-year project involving analysis of data from a special raingage network on the basis of in-

dividual rain periods, months, and seasons during 1965-1969 was planned to define the areal extent of the hill high. Third, the results of these two studies were used to design a 1-month field study involving a weather radar, 3 cloud cameras, 5 weather (temperature-humidity) stations, 1 pilot balloon site, and aircraft sampling flights. (Humphreys-ISWS)
W74-11138

WARM FOG DISPERSAL TECHNIQUES,
Navy Weather Research Facility, Norfolk, Va.
For primary bibliographic entry see Field 3B.
W74-11200

A SUMMARY OF THE U.S. NAVY PROGRAM AND FY 1970 PROGRESS IN WEATHER MODIFICATION AND CONTROL.
Navy Weather Research Facility, Norfolk, Va.
For primary bibliographic entry see Field 3B.
W74-11203

ATMOSPHERIC WATER RESOURCES MANAGEMENT PROGRAM,
Montana State Univ., Bozeman. Dept. of Earth Sciences.
For primary bibliographic entry see Field 3B.
W74-11229

EROSIONAL AND DEPOSITIONAL ASPECTS OF HURRICANE CAMILLE IN VIRGINIA, 1969,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 2J.
W74-11233

SEVENTH ANNUAL SURVEY REPORT ON THE AIR WEATHER SERVICE WEATHER MODIFICATION PROGRAM (FY 1974),
Air Weather Service, Washington, D.C.
For primary bibliographic entry see Field 3B.
W74-11433

2C. Snow, Ice, and Frost

METHOD OF CLEARING A PATH THROUGH ICE,
Global Marine Inc., Los Angeles, Calif.
For primary bibliographic entry see Field 8C.
W74-11051

AN EMPIRICAL INTERMOLECULAR POTENTIAL ENERGY FUNCTION FOR WATER,
Cornell Univ., Ithaca, N.Y. Dept. of Chemistry.
For primary bibliographic entry see Field 2K.
W74-11106

ROLE OF THE ENVIRONMENT IN THE FORMATION OF DENSITY DYNAMICS OF THE MUSKRAT OF YAKUTSK, (IN RUSSIAN),
Akademiya Nauk SSSR, Yakutsk. Institut Biologii.
Yu. V. Labutin, and M. V. Popov.
Ekologiya. Vol 4, No 3, p 70-76, 1973. Illus.

Descriptors: *Animal populations.
Identifiers: Muskrat, Ondatra zibethica, Trapping, Yakutsk(USSR).

The most important environmental factors determining the density dynamics of the muskrat (Ondatra zibethica) in Yakutia, USSR are the weather conditions, hydrologic regime of the waters and trapping. The most significant of the abiotic factors is freezing of the waters, since the subglacial mode of life of the muskrat in Yakutia lasts about 8 mo. (Oct-May). Rigorous winters with little snow lead to freezing of the shallow feeding areas of the waters and cause a drop in the numbers of the muskrat. High floods and droughts have the same effect. Trapping in 1963-64 amounted to about 200,000 pelts.--Copyright 1974, Biological Abstracts, Inc.
W74-11198

CATALOG OF USSR GLACIERS. VOLUME 16. ANGARA-YENISEY REGION. NO. 1. YENISEY. PARTS 3-5. NO. 2. ANGARA. PART 1. (KATALOG LEDNIKOV SSSR. TOM 16. ANGARO-YENISEYSKIY RAYON. VYPUSK 1. YENISEY. CHASTI 3-5. VYPUSK 2. ANGARA. CHAST' 1),
Akademiya Nauk SSSR, Moscow. Institut Geografii.
V. I. Sil'nitskaya, and L. P. Chernova.
Gidrometeoizdat, Leningrad, 1973. 64 p.

Descriptors: *Glaciers, *Data collections, Glaciation, Climatology, Geomorphology, Firn, Runoff, Ablation, Glacial drift, River basins, Stations, Investigations, Publications, Maps.
Identifiers: *USSR, *Angara River(USSR), *Yenisey River(USSR).

Geographic location, morphology, climatic conditions, and regime of glaciers were investigated in the Angara-Yenisey Region in East Siberia. Areas covered are the Kazyr and Kan River basins, Kemchik River basin, the basin in upper reaches of the Yenisey River upstream from the mouth of the Kemchik River, and basins in upper reaches of the Oka and Uda Rivers. Attention is focused on glacier-surface characteristics which influence river regime and amount and distribution of runoff through time. Basic glacier data, onsite and station glacier investigations, and lists of pertinent glacier publications and of hydrometeorological stations in the vicinity of glaciers are tabulated. All parts of the 'Catalog of USSR Glaciers' were compiled at the Department of Glaciology of the USSR Academy of Science's Institute of Geography. (Josefson-USGS)
W74-11213

CATALOG OF USSR GLACIERS. VOLUME 15. ALTAY AND WEST SIBERIA. NO. 1. GORNYY ALTAY AND UPPER IRTYSH. PART 6. CHUYA RIVER BASIN (KATALOG LEDNIKOV SSSR. TOM 15. ALTAY I ZAPADNAYA SIBIR'. VYPUSK 1. GORNYY ALTAY I VERKHNIY IRTYSH. CHAST' 6. BASSEYN R. CHUI),
Tomsk State Univ. (USSR).
M. A. Dushkin.
Gidrometeoizdat, Leningrad, 1974. 60 p.

Descriptors: *Glaciers, *Data collections, Glaciation, Climatology, Geomorphology, Ice, Snowpacks, Firn, Runoff, Ablation, Melting, Glacial drift, River basins, Stations, Precipitation gages, Investigations, Publications, Maps.
Identifiers: *USSR(Altay Territory), *Gorno-Altaysk Autonomous ' Oblast(USSR), *Irtysh River(USSR), *Chuya River basin(USSR).

Geographic location, morphology, climatic conditions, and regime of glaciers were investigated in the Chuya River basin in southern Gorno-Altaysk Autonomous Oblast in the Altay Territory. Basic glacier data, onsite and station glacier investigations, and lists of pertinent glacier publications and of hydrometeorological stations and precipitation gages in the vicinity of glaciers are tabulated. Part 6 of the 'Catalog of USSR Glaciers' was compiled at the Department of Glaciology of Tomsk State University in 1965-69. (Josefson-USGS)
W74-11214

CATALOG OF USSR GLACIERS. VOLUME 14. SOVIET CENTRAL ASIA. NO. 3. AMU-DAR'YA. PART 6. SURKHOB RIVER BASIN BETWEEN MOUTHS OF THE OBIKHINGOU AND MUKSU RIVERS (KATALOG LEDNIKOV SSSR. TOM 14. SREDNYAYA AZIYA. VYPUSK 3. AMU-DAR'YA. CHAST' 6. BASSEYN R. SURKHOB MEZHDU UST'YAMI REK OBIKHINGOU I MUKSU),
Akademiya Nauk SSSR, Moscow. Institut Geografii.
G. M. Varnakova, and O. V. Rototayeva.
Gidrometeoizdat, Leningrad, 1971. 91 p.

Descriptors: *Glaciers, *Data collections, Glaciation, Climatology, Geomorphology, Snowpacks, Firn, Runoff, Ablation, River basins, Tributaries, Stations, Precipitation gages, Investigations, Publications, Maps.
Identifiers: *USSR(Central Asia), *Amu-Dar'ya River(USSR), *Surkhob River basin(USSR).

Geographic location, morphology, climatic conditions, and regime of glaciers were investigated in the Surkhob River basin between mouths of the Obikhingou and Muksu Rivers in the western part of the Pamir-Alay Mountains. Basic glacier data, onsite and station glacier investigations, and lists of pertinent glacier publications and of hydrometeorological stations and precipitation gages in the vicinity of glaciers are tabulated. Part 6 of the 'Catalog of USSR Glaciers' was compiled at the Department of Glaciology of the USSR Academy of Science's Institute of Geography. (Josefson-USGS)
W74-11215

CATALOG OF USSR GLACIERS. VOLUME 8. NORTHERN CAUCASUS. PART 6. CHEGEM RIVER BASIN. PART 7. CHEREK RIVER BASIN(KATALOG LEDNIKOV SSSR. TOM 8. SEVERNYY KAVKAZ. CHAST' 6. BASSEYN R. CHEGEMA. CHAST' 7. BASSEYN R. CHEREKA),
Akademiya Nauk SSSR, Moscow. Institut Geografii.
V. D. Panov, and T. V. Psareva.
Gidrometeoizdat, Leningrad, 1973. 96 p.

Descriptors: *Glaciers, *Data collections, Glaciation, Climatology, Geomorphology, Ice, Snowpacks, Firn, Runoff, Ablation, River basins, Stations, Precipitation gages, Investigations, Publications, Maps.
Identifiers: *USSR(Caucasus Mountains region), *Chegem River basin(USSR), *Cherek River basin(USSR).

Geographic location, morphology, climatic conditions, and regime of glaciers were investigated in the Chegem and Cherek River basins in the Northern Caucasus. Basic glacier data, onsite and station glacier investigations, and lists of pertinent glacier publications and of hydrometeorological stations and precipitation gages in the vicinity of glaciers are tabulated. Part 6 and 7 of the catalog of USSR Glaciers' were compiled at the Northern Caucasian Administration of the Hydrometeorological Service and at the Department of Glaciology of the USSR Academy of Science's Institute of Geography. (Josefson-USGS)
W74-11216

CATALOG OF USSR GLACIERS. VOLUME 14. SOVIET CENTRAL ASIA. NO 1. SYRDAR'YA. PART 4. (KATALOG LEDNIKOV SSSR. TOM 14. SREDNYAYA AZIYA. VYPUSK 1. SYRDAR'YA. CHAST' 4.),
V. I. Sysenko, Yu. P. Barbat, and L. G. Cherkasov.
Gidrometeoizdat, Leningrad, 1973. 60 p.

Descriptors: *Glaciers, *Data collections, Glaciation, Climatology, Geomorphology, Snowpacks, Runoff, Glacial drift, River basins, Tributaries, Stations, Precipitation gages, Investigations, Publications, Maps.
Identifiers: *USSR(Central Asia), *Syrdar'ya River(USSR), *Naryn River(USSR).

Geographic location, morphology, climatic conditions, and regime of glaciers were investigated in

basins of right-bank tributaries of the Naryn River from mouth of the Kekemeren River to mouth of the Malyy Naryn in Soviet Central Asia. Basic glacier data, onsite and station glacier investigations, and lists of pertinent glacier publications and of hydrometeorological stations and precipitation gages in the vicinity of glaciers are tabulated. Part 4 of the 'Catalog of USSR Glaciers' was compiled by workers of the snow-survey and hydrographic party of the Kirgiz Administration of the Hydrometeorological Service. (Josefson-USGS)
W74-11217

CATALOG OF USSR GLACIERS. VOLUME 17. LENA-INDIGIRKA REGION. NO. 2. MIDDLE LENA. PART 1; NO. 5. LOWER LENA. PART 2. (KATALOG LEDNIKOV SSSR. TOM 17. LENSKO-INDIGIRSKIY RAYON. VYPUSK 2. SREDNYAYA LENA. CHAST' 1; VYPUSK 5. NIZHNYAYA LENA. CHAST' 2.),
Akademiya Nauk SSSR, Moscow. Institut Geografii.
Z. S. Novikova, A. M. Grinberg, and D. K. Bashiavin.
Gidrometeoizdat, Leningrad, 1972. 44 p.

Descriptors: *Glaciers, *Data collections, Glaciation, Climatology, Geomorphology, Ice, Snowpacks, Firn, Ablation, River basin, Stations, Investigations, Publications, Maps.
Identifiers: *USSR, *Lena River(USSR), *Chara River basin(USSR), *Vitim River basin(USSR), Orulgan Mountains(USSR).

Geographic location, morphology, climatic conditions, and regime of glaciers were investigated in the Chara and Vitim River basins (Kodar Mountains) and in the Orulgan Mountains in the Lena-Indigirka Region in East Siberia. Basic glacier data, onsite and station glacier investigations, and lists of pertinent glacier publications and of hydrometeorological stations in the vicinity of glaciers are tabulated. Part 1 of the 'Catalog of USSR Glaciers' was compiled at the Department of Glaciology of the USSR Academy of Science's Institute of Geography, and Part 2 was compiled by workers at the All-Union Aerogeological Trust of the USSR Ministry of Geology. (Josefson-USGS)
W74-11218

CATALOG OF USSR GLACIERS. VOLUME 14. SOVIET CENTRAL ASIA. NO. 2. KIRGIZIA. PART 3. BASIN IN UPPER REACHES OF THE CHU RIVER (KATALOG LEDNIKOV SSSR. TOM 14. SREDNYAYA AZIYA. VYPUSK 2. KIRGIZIYA. CHAST' 3. BASSEYN VERKHOV'YEV R. CHU),
V. A. Cheban, and A. A. Yablokov.
Gidrometeoizdat, Leningrad, 1971. 56 p.

Descriptors: *Glaciers, *Data collections, Glaciation, Climatology, Geomorphology, Ice, Snowpacks, Firn, Runoff, Ablation, Melting, River basins, Stations, Precipitation gages, Investigations, Publications, Maps.
Identifiers: *USSR(Central Asia), *Kirgiz SSR, *Chu River(USSR).

Geographic location, morphology, climatic conditions, and regime of glaciers were investigated in the basin of upper reaches of the Chu River in northern Kirgiz SSR. Basic glacier data, onsite and station glacier investigations, and lists of pertinent glacier publications and of hydrometeorological stations and precipitation gages in the vicinity of glaciers are tabulated. Part 3 of the 'Catalog of USSR Glaciers' was compiled by workers of the snow-survey and hydrographic party of the Kirgiz Administration of the Hydrometeorological Service. (Josefson-USGS)
W74-11219

CATALOG OF USSR GLACIERS. VOLUME 14. SOVIET CENTRAL ASIA. NO. 1. SYRDAR'YA. PART 6. ATBASHI RIVER BASIN (KATALOG LEDNIKOV SSSR. TOM 14. SREDNYAYA AZIYA. VYPUSK 1. SYRDAR'YA. CHAST' 6. BASSEYN R. ATBASHI),
N. P. Prokopova, and V. P. Fateyev.
Gidrometeoizdat, Leningrad, 1974. 48 p.

Descriptors: *Glaciers, *Data collections, Glaciation, Climatology, Geomorphology, Firn, Runoff, Ablation, Glacial drift, River basins, Stations, Precipitation gages, Investigations, Publications, Maps.
Identifiers: *USSR(Central Asia), *Syrdar'ya River(USSR), *Atbashi River basin(USSR).

Geographic location, morphology, climatic conditions, and regime of glaciers were investigated in the Atbashi River basin in Soviet Central Asia. Basic glacier data on 284 glaciers covering 113.7 sq km, onsite and station glacier investigations, and lists of pertinent glacier publications and of hydrometeorological stations and precipitation gages in the vicinity of glaciers are tabulated. Part 6 of the 'Catalog of USSR Glaciers' was compiled by workers of the snow-survey and hydrographic party of the Kirgiz Administration of the Hydrometeorological Service. (Josefson-USGS)
W74-11220

CATALOG OF USSR GLACIERS. VOLUME 14. SOVIET CENTRAL ASIA. NO. 2. KIRGIZIA. PART 2. BASINS OF LEFT-BANK TRIBUTARIES OF THE CHU RIVER DOWNSTREAM FROM MOUTH OF THE KOMORCHEK RIVER (KATALOG LEDNIKOV SSSR. TOM 14. SREDNYAVA AZIYA. VYPUSK 2. KIRGIZIYA. CHAST' 2. BASSEYNY LEVYKH PRITOKOV R. CHU NIZNE USTYA R. KOMORCHEK),
Leningrad State Pedagogical Inst. (USSR).
Ye. V. Maksimov, and V. Ya. Bazheva.
Gidrometeoizdat, Leningrad, 1973. 71 p.

Descriptors: *Glaciers, *Data collections, Glaciation, Climatology, Geomorphology, Ice, Firn, Ablation, Melting, Glacial drift, River basins, Tributaries, Stations, Precipitation gages, Investigations, Publications, Maps.
Identifiers: *USSR(Central Asia), *Kirgiz SSR, *Chu River(USSR).

Geographic location, climatic conditions, morphology, and regime of glaciers were investigated on northern slopes of the Kirgiz Alatau in Soviet Central Asia. Special attention was given to buried glaciers and to glacier termini covered by a thick layer of fragmental material. Basic glacier data, onsite and station glacier investigations, and lists of pertinent glacier publications and of hydrometeorological stations and precipitation gages in the vicinity of glaciers are tabulated. Part 2 of the 'Catalog of USSR Glaciers' was compiled at the Department of Geography of Leningrad State Pedagogical Institute im. A.I. Gertsen and at the Department of Glaciology of the USSR Academy of Science's Institute of Geography. (Josefson-USGS)
W74-11221

NORTH CASCADES HIGHWAY SR-20 AVALANCHE ATLAS,
Washington Univ., Seattle. Dept. of Civil Engineering.
E. R. La Chapelle, and R. Leonard.
Available from NTIS, Springfield, Va 22161 as PB-220 336, Price $3.00 printed copy; $2.25 microfiche. Report for Washington State Highway Commission, June 1971. 175 p.

Descriptors: *Avalanches, *Highways, Roads, *Washington, Hazards, *Maps, Mapping, *Data collections.
Identifiers: *North Cascades Highway(Wash).

This Avalanche Atlas catalogs details of snow avalanche activity along the North Cascades Highway, Washington, SR-20, between Newhalem on the west side of the Cascade Mountains and Mazama on the east side. The Atlas, prepared in loose-leaf form, is designed primarily as an operational guide for Highway Department maintenance personnel who will be involved in snow removal operations on SR-20. Each avalanche path is outlined on annotated maps and photographs. Normally, this outline indicates the maximum recognizable extent of past avalanche activity on each path. The hazard rating given on each Summary Sheet is a subjective estimate of the encounter probability between a falling avalanche and moving highway traffic. (Knapp-USGS)
W74-11226

EVALUATION OF GLACIER MASS BALANCE BY OBSERVING VARIATIONS IN TRANSIENT SNOWLINE POSITIONS,
Norwegian Water Resources and Electricity Board, Oslo.
G. Ostrem.
Available from NTIS, Springfield, Va., 22161 as N74-13055, Price $3.00 printed copy; $2.25 microfiche. Report 376 for The Royal Norwegian Council for Scientific and Industrial Research (NTNF), October 1973. 8 p, 3 fig, 1 tab, 3 ref.

Descriptors: *Glaciers, *Water balance, *Remote sensing, Snowpacks, Satellites(Artificial), Snow surveys, Snow cover, Mountains, Glaciohydrology.
Identifiers: *Snowline, *Norway.

The position of the transient snowline on glaciers in South Norway was studied by remote sensing to evaluate glacier mass balance at glaciers where no direct observations are made. The height of the transient snowline on glaciers is closely tied to the mass balance; it will reach higher altitudes in years of negative mass balance, when rivers gain extra amounts of melt water from glacier retreat. The correlation between snowline heights and glacier mass balance is known for eight glaciers in South Norway; repeated satellite imagery can be used both to extrapolate similar information to a large number of glaciers and to estimate the mass balance for a great number of glaciers at the end of any melt season. (Knapp-USGS)
W74-11437

AVALANCHES ON THE NORTH CASCADES HIGHWAY (SR-20)--SUMMARY REPORT,
Washington Univ., Seattle. Dept. of Civil Engineering.
E. R. La Chapelle, and C. B. Brown.
Available from NTIS, Springfield, Va. 22161 as PB-220 337, Price $3.00 printed copy; $2.25 microfiche. Washington University Geophysics Program and Department of Civil Engineering Report for Washington State Highway Commission, September 1971. 65 p, 7 fig, 2 tab.

Descriptors: *Avalanches, *Highways, *Washington, *Roads, Hazards, Data collections, Safety.
Identifiers: *North Cascades Highway(WA).

Snow and avalanche climate varies widely across the parts of the Cascade Mountains of Washington. Little information is presently available about temperatures and weather patterns over the passes, but a limited amount of snow depth data are available from snow courses. These snow data are presented and analyzed. Several distinct zones of avalanche activity extend form Newhalem on the west to Early Winters Creek on the east. These zones each have distinct types of avalanche occurrence and patterns of hazard for the highway. Periods of high hazard for different zones do not coincide in time. Due to the wilderness nature of the highway and lack of public facilities, the whole highway probably has to be closed each time hazard develops in any one zone. The most serious danger from avalanches exists in the Liberty Bell and Cutthroat Ridge zones between Washington

Pass and Cutthroat Creek. The recommended method of dealing with avalanche hazards on SR-20 is management of traffic flow, closures, and artificial avalanche release. The percentage of time the highway can be kept open in the winter depends on a trade-off with costs and desired level of public safety. In general, a decrease in closure time can be obtained only at the price of increasingly complex and costly avalanche control. Reducing closure time lower than 15%-20% does not presently appear feasible. This level of operation will be possible only after several years of experience. (Knapp-USGS)
W74-11444

INVESTIGATION AND CALCULATION OF ICE JAMS (ISSLEDOVANIYE I RASCHETY ZATOROV I ZAZHOROV L'DA).
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
Gosudarstvennyy Gidrologicheskiy Institut Trudy, No 219, Chizhov, A. N., editor, Leningrad, 1974. 87 p.

Descriptors: *Ice, *Ice cover, *Ice jams, *Rivers, Ice breakup, Ice loads, Melting, Water levels, Hydroelectric plants, Tailwater, Model studies, Meteorology, Aerial photography, Equations.
Identifiers: *USSR(Dniester River).

Problems of ice jams on rivers were investigated in this collection of 6 papers prepared by the State Hydrologic Institute in Leningrad. Titles of individual papers are: (1) formation of ice jams on the Dniester River; (2) investigation of stability of ice cover on the Dniester in spring; (3) model studies of ice-jam formation for justification of a method of ice retention on the Dniester and for determination of ice loads; (4) ice-jam formation patterns in tailwater channels of hydroelectric powerplants; (5) model studies of ice movement under ice cover; and (6) use of aerial surveys for investigation of ice jams. (Josefson-USGS)
W74-11445

GLACIOHYDROCLIMATOLOGY OF MOUNTAINOUS COUNTRIES (GLYATSIOGIDROKLIMATOLOGIYA GORNYKH STRAN).
Mezhduvedomstvennyy Geofizicheskiy Komitet pri Presidiume Akademii Nauk SSSR, Glyatsiologicheskiye Issledovaniya, No 24, Izdatel'stvo 'Nauka', Moscow, Kotlyakov, V.M., editor, 1973. 200 p.

Descriptors: *Glaciology, *Glaciohydrology, *Climatology, *Mountains, Regions, Basins, Glaciers, Glaciation, Alpine, Hydrologic cycle, Runoff, Ablation, Melting, Snowmelt, Snowpacks, Snow surveys, Meteorology, Precipitation(Atmospheric), Temperature, Winds.
Identifiers: *USSR, Caucasus, Soviet Central Asia, Altay Territory, Glacier mass budget.

This collection contains 26 papers prepared on the basis of reports presented at the Fourth All-Union Symposium on Glaciology held at Terskol in 1968. Investigations on glaciohydrology and climatology of mountainous countries are currently extensively conducted in the USSR in mountains of the Caucasus, Soviet Central Asia, and Altay after the framework of the International Hydrological Decade. Published results are of theoretical importance for calculating water balance of mountain-glacier basins and of practical importance with regard to water-resources use in mountainous regions. (Josefson-USGS)
W74-11446

2D. Evaporation and Transpiration

PHYSIOLOGICAL CHARACTERISTICS OF TREES AND SHRUBS CULTIVATED IN THE SOUTHERN STEPPES OF THE UKRAINE, (IN RUSSIAN),
B. F. Morozov.
Tr Kishinev S-Kh Inst. 93. p 86-93. 1972.

Descriptors: *Transpiration, Plant physiology.
Identifiers: Almond, Apricot, Cherry, Forestation, Honey locust, Mahaleb cherry, Russian olive.

Under the arid conditions of the southern steppes of the Ukraine (USSR) mesophytes having comparatively better water exchange and enduring profound changes in protein metabolism are the most suitable shrubs and trees for field protection afforestation. Such plants include honey locust, Russian olive, apricot, Mahaleb cherry, and almond. Tables of the moisture content of the soil in Aug. at the boundary of the II A and III A agroclimatic regions (in the vicinity of Gvardeiskoe, Crimea), of moisture content of the leaves and transpiration rate of 10 tree species, sugar content in the leaves of 14 ssp., and of content of protein N in leaves are presented.--Copyright 1974, Biological Abstracts, Inc.
W74-11177

EVAPORATION OF WATER FROM SAND, 3: THE LOSS OF WATER INTO THE ATMOSPHERE FROM A SANDY RIVER BED UNDER ARID CLIMATIC CONDITIONS,
National Inst. for Water Research, Windhoek (South West Africa).
D. H. R. Hellwig.
Journal of Hydrology, Vol 18, No 3/4, p 305-316, March, 1973. 2 fig, 5 tab, 17 ref.

Descriptors: *Evaporation, *Evapotranspiration, Consumptive use, *Water loss, Phreatophytes, *Arid climates, *Sands.

The Penman formula was applied to calculate evaporation and evapotranspiration losses under arid climatic conditions from a sandy river bed. Good agreement with measured results was obtained. The loss of water into the atmosphere from a river bed covering 8300 ha was estimated to be 76 million cu m/y. Evapotranspiration contributed 68% and permanently wet areas 19.5% to the total water loss. The rest evaporated from temporary wet areas. Substantial volumes of water can possibly be gained by the removal of phreatophytes. (See W73-07055, W73-07056 and W74-11267) (Skogerboe-Colorado State)
W74-11266

EVAPORATION OF WATER FROM SAND, 4: THE INFLUENCE OF THE DEPTH OF THE WATER-TABLE AND THE PARTICLE SIZE DISTRIBUTION OF THE SAND,
National Inst. of Water Research, Windhoek (South West Africa).
D. H. R. Hellwig.
Journal of Hydrology, Vol 18, No 3/4, p 317-327, March, 1973. 6 fig, 5 tab, 11 ref.

Descriptors: *Evaporation, *Consumptive use, Water loss, Acid climates, *Water table, Depth, Groundwater, *Particle size, *Sands.

Experiments were carried out to determine the influence of the depth of the water-table and the particle size of sand on evaporation of water from sand. Dropping the water table in sand, with a mean diameter of 0.53 mm, below 60 cm will practically prevent evaporation losses. The coarseness of the sand does not affect evaporation if the water table is kept at the sand surface. If the water table is kept below the sand surface, evaporation decreases with the coarseness of the sand and with the depth of the water table. Evaporation from an open water surface was 8% higher than from water-saturated sand, most probably due to higher energy storage in a body of water resulting in a greater temperature gradient between the evaporation surface of the water and the air during the night, as compared to a water-saturated sand. (See W74-11266) (Skogerboe-Colorado State)
W74-11267

A WEIGHING SYSTEM FOR LYSIMETERS,
Department of Agriculture, Ottawa (Ontario). Engineering Research Service.
P. W. Voisey, and E. W. Hobbs.
Canadian Agricultural Engineering, Vol 14, No 2, p 82-84, December, 1972. 3 fig, 25 ref.

Descriptors: *Lysimeters, *Weight, *Evapotranspiration, Soil moisture, Soilwater, Consumptive use, Soilwater-plant relationships.

A technique is described for weighing lysimeters using a strain gage load cell and an electronic indicating system. The nominal weight of the lysimeter is eliminated from the measurement by offsetting the indicator zero electrically using a weight. This increases the possible resolution and accuracy of measurement. In the example described, weight changes of plus or minus 22.7 kg in lysimeters weighing 180 kg with a resolution of 0.045 kg and accurate within 0.090 kg were measured. Weighing of 36 such lysimeters could be accomplished in two hours. (Skogerboe-Colorado State)
W74-11277

A NEW ECOPHYSIOLOGICAL APPROACH TO FOREST-WATER RELATIONSHIPS IN ARID CLIMATES,
For primary bibliographic entry see Field 2I.
W74-11386

RATE OF EVAPORATION OF WATER FROM CAPILLARIES OF DIFFERENT DIAMETER INTO MOIST AIR (SKOROST' ISPARENIYA VODY IZ KAPILLYAROV RAZNYKH DIAMETROV VO VLAZHNYY VOZDUKH),
Akademiya Nauk SSSR, Moscow. Institut Fizicheskoi Khimii.
N. V. Churayev, and N. Ye. Yashchenko.
Pochvovedeniye, No 9, p 105-112, September 1973. 4 fig, 18 ref.

Descriptors: *Soil physics, *Evaporation, *Air-water interfaces, *Capillary action, *Films, Diffusion, Humidity, Vapor pressure, Isotherms, Surfaces, Quartz, Instrumentation, Measurement, Curves, Equations.
Identifiers: USSR.

Patterns of evaporation of water from capillaries into moist air and of evaporation into a vapor-unsaturated atmosphere are determined by the type of isotherms of disjoining water-film pressure on a quartz surface. Formation of a beta water film near the meniscus results in displacement of the evaporation area in a capillary by a value which increases as the capillary radius decreases. The flow of polymolecular alpha films along a capillary surface produces an increase in effective diffusion coefficients as compared to coefficients of molecular vapor diffusion through air. The effect of film flow can be observed experimentally at a humidity of 0.86 in capillaries with radii less than 10 microns and at a humidity of 0.96 in capillaries with radii less than 20 microns. The contribution of film transport is noticeable only at humidity values approaching unity and in fine capillaries. Possibilities of varying the rate of evaporation of water from capillaries by suppressing or intensifying film transport are examined. (Josefson-USGS)
W74-11448

2E. Streamflow and Runoff

THE EFFECT OF HYDROMETEOROLOGICAL CONDITIONS ON THE ZETA-POTENTIAL OF SUSPENDED SOLIDS (HIDROMETEOROLOGIAI VISZONYOK

HATASA A LEBEGO ANYAGOK ZETA-POTENCIALJARA),
For primary bibliographic entry see Field 5B.
W74-10907

A FINITE ELEMENT APPROACH TO WATERSHED RUNOFF,
University Coll. of Swansea (Wales). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2A.
W74-10937

NEW ANALYTICAL SOLUTIONS FOR DYE DIFFUSION EQUATIONS,
Princeton Univ., N.J. Water Resources Program.
R. W. Cleary, and D. D. Adrian.
Journal of the Environmental Engineering Division, American Society of Civil Engineers Vol 99, No EE3, Paper 9770, p 213-227, June 1973. 3 fig, 1 tab, 21 ref, append. OWRR A-041-MASS(2).

Descriptors: *Dye dispersion, *Dye releases, *Equations, *Diffusion, *Dispersion, Boundary processes, Open channel flow, Turbulent flow, Mixing, Mathematical models, Streamflow.

Partial differential equations describing the concentration distribution of a tracer dye released as an instantaneous source (line or point) subject to no-flux boundary conditions at the river bottom, surface, and banks were derived analytically using integral transform methods. The river is considered finite in the vertical and lateral directions, the dye source location is arbitrary, and the results represent two- and three-dimensional analytical solutions of tracer modeling and include the boundary effects of the river. The solutions have particular application in the calculation of turbulent diffusion coefficients in two and three dimensions. (Knapp-USGS)
W74-11021

RIVER MILE INDEX--VIRGIN RIVER BASIN, ARIZONA, NEVADA, UTAH.
Bureau of Reclamation, Boulder City, Nev., Region 3.
Pacific Southwest Inter-Agency Committee, Water Management Sub-Committee Report, March 1974. 21 p, 2 map.

Descriptors: *Rivers, *Nevada, *Utah, Arizona, Mapping, Tributaries, River basins, Geographical regions.
Identifiers: *River mile index, *Virgin River(Utah), *Muddy River(Utah).

This river mile index for the Virgin and Muddy Rivers in southern Nevada and Utah and the northwestern tip of Arizona is one of a series of reports to be issued for stream basins in the Pacific Southwest. River mileages were determined from measurements made on U.S. Geological Survey topographic quadrangles. The U.S. Geological Survey furnished information on stream gage locations, drainage areas, and water elevations at key points. River mile distances were measured upstream from the mouth to the nearest tenth mile. Tributaries are shown as entering from the right or left from a position facing downstream. (Knapp-USGS)
W74-11030

LONG WAVE EXCITATION IN HARBOURS--AN ANALYTICAL STUDY,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W74-11031

LARCH LITTER REMOVAL HAS NO SIGNIFICANT EFFECT ON RUNOFF,
Forest Service (USDA), La Crosse, Wis. Watershed Lab.
R. S. Sartz, and D. N. Tolsted.
USDA Forest Service/Research Note NC-163, 1974, 2 p, 1 tab, 3 ref.

Descriptors: *Runoff, *Litter, *Overland flow, *Forest watersheds, Leaves, Infiltration, Forest soils, Coniferous forests.
Identifiers: Larch trees.

Runoff was measured in an 11-year-old plantation of European larch (Larix decidua) on paired plots from which litter had either been or not been removed. On five of the six pairs, the plot on which litter had been left intact yielded more runoff, but the differences were neither statistically nor hydrologically significant. (Brown-IPC)
W74-11071

ROUGHNESS COEFFICIENTS OF VEGETATED FLOOD PLAINS,
Ministry of Transport and Waterways, the Hague (Netherlands). Maas-River Study Div.
G. J. Klaassen, and Zwaard J. J. Van Der.
Journal of Hydraulic Research, Vol 12, No 1, p 43-63, 1974. 20 fig, 7 ref.

Descriptors: *Roughness(Hydraulic), *Roughness coefficient, *Flood plains, Rivers, Flow resistance, Overland flow, River flow, Flow characteristics, Trees, *Chezy equation, Hydraulic models, Model studies.
Identifiers: *Vegetated flood plains, *Netherlands(River Mass), Hedges.

A model study was conducted on the hydraulic resistance of hedges and fruit trees which are common in the flood plain of the River Maas. The hedges, which grow to a height of 2 to 4 m, serve as partitions between plots of agricultural land. The fruit trees grow to a height of 2.5 to 3 m. A full-scale study using hedges from the flood plain of the Maas was made. The resistance of fruit trees was studied on a 1 to 10 scale. The Chezy coefficient of the flood plain was especially influenced by the spacing of the hedges, the number of trees per unit area in an orchard and by the water level over the flood plain. Removal of vegetation resulted in lower water levels and smaller mean current velocities in the summer bed and can, therefore, be useful as a means to compensate unfavorable effects caused by river-works in the flood plain. A graph is given showing the variation of Chezy coefficient with water depth and hedge spacing for flood plains. Another graph shows the variation of Chezy coefficient with water depth and number of fruit trees per unit area for flood plains. (Humphreys-ISWS)
W74-11136

VARIED FLOW FUNCTIONS FOR ELLIPTIC CHANNELS,
Iowa Univ., Iowa City. Inst. of Hydraulic Research.
For primary bibliographic entry see Field 8B.
W74-11139

INTRODUCTION TO THE FAUNISTIC STUDY OF DIPTERA IN A STREAM FROM THE PYRENEES NEAR THE ATLANTIC COAST: THE LISSURAGA, (IN FRENCH),
Station d'Hydrobiologie Continentale, Biarritz (France).
A. Neveu.
Ann Hydrobiol. Vol 3, No 2, p 173-196. 1972. Illus. English summary.

Descriptors: *Diptera, Aquatic insects.
Identifiers: Chironomidae, France, Lissuraga, Pyrenees, Salmonidae, Simuliidae.

A study carried on in a stream in the Pyrenees-Atlantiques (France) elucidated the part played by insects with aquatic larvae in the food of Salmonidae. Results for Diptera are presented. A first analysis showed the efficiency of capture methods on the various families, a preliminary condition to a more quantitative evaluation. The study of the faunistic composition showed the numerical size of 2 Diptera families: Chironomidae and Simuliidae, which make up 80-90% of the faunistic stock. The composition varies according to biotopes, in particular with regard to the location on the stream and to the substratum. Different stations have thus been studied over 5 km of stream, with regular samplings during 3 yr in various facies conditions. Density variations in stocks of Diptera larvae in time and space were shown. Populations were important in spring and autumn; in winter, sudden floods reduce them and in summer too warm waters slow down development, and result in a lack of micro-organisms. Fluctuations in stocks and their low enough mean level, due to excessively well-wooded banks, allow an explanation for the slow growth of Salmonidae in this stream to be formulated. It is thus possible to make a connection between the periods of fish growth and the presence of large populations of Diptera larvae.--Copyright 1974, Biological Abstracts, Inc.
W74-11179

FALL INCREASE OF THE POPULATION OF AQUATIC MITES IN THE MOUTHS OF RIVERS AND STREAMS, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennykh Vod.
P. V. Tuzovskii.
Biol Vnutr Vod Inform Byull. 15. p 48-49. 1972.

Descriptors: *Mites, Aquatic insects.
Identifiers: Forella variegator, Mideopsis orbicularis, Insect populations.

Aquatic mites were counted every 10 days in the mouth of the Krasnoe stream near Borok (Rybinsk reservoir) (USSR) by means of a Mordukhai-Boltovskii tubular bottomgrab. Fourteen species were recorded. Beginning with the third wk. of Sept. there was a marked increase of the population of mites from 825 to 39,400 specimens/m2 with a subsequent equally marked drop beginning in the third wk. of Oct. Forella variegator and Mideopsis orbicularis dominated (respectively 47.1 and 17.8% of the total number of mites). Such a high population was probably due to the concentration of mites on the muddy bottom of the stream as the level of the reservoir was drawn down. Then the mites withdrew from the receding water and migrated deep into the body of water. Vast quantities of predaceous mites can have a substantial role in regulating the population of certain groups of invertebrates.--Copyright 1974, Biological Abstracts, Inc.
W74-11181

OLIGOCHAETA IN THE INTERSTITIAL WATERS, (IN POLISH),
Polish Academy of Sciences, Poznan. Inst. of Zoology.
K. Kasprzak.
Przegl Zool. Vol 17, No 1, p 41-44, 1973. Illus. English summary.
Identifiers: Enchytraeidae, Naididae, Oligochaeta, Tubificidae, Insect populations.

The structure of a community of Oligochaeta inhabiting interstitial waters of rivers and streams of southern Poland was characterized. The community was well defined and presented a remarkable structure of domination characterized by a small number of dominating species and a considerable number of accidental ones. Of the families of Oligochaeta occurring in this environment, Naididae, Tubificidae and Enchytraeidae dominated.--Copyright 1974, Biological Abstracts, Inc.
W74-11199

AUTOCORRELATION STRUCTURE OF MONTHLY STREAMFLOWS,
Geological Survey, Reston, Va. Water Resources Div.

M. E. Moss, and M. C. Bryson.
Water Resources Research, Vol 10, No 4, p 737-744, August 1974. 10 fig, 1 tab, 15 ref.

Descriptors: *Correlation analysis, *Streamflow, *Mathematical models, *Time series analysis, Base flow, Variability, Stochastic processes, Simulation analysis, Statistical models.
Identifiers: *Autocorrelation.

The autocorrelation structure of monthly streamflows, a nonstationary process, was developed from a mathematical model that assumes that monthly precipitation is an independent series and that the base flow of the stream is derived from a linear aquifer. Under these assumptions the first-order autocorrelation coefficients of streamflow vary seasonally, as do other statistics such as monthly means and standard deviations. Comparison of the autocorrelation coefficients predicted by the model with those computed from an actual streamflow record of 58 years indicates that the seasonality of streamflow is well represented by the model. (Knapp-USGS)
W74-11419

GENERALIZED SKEW COEFFICIENTS OF ANNUAL FLOODS IN THE UNITED STATES AND THEIR APPLICATION,
Geological Survey, Reston, Va.
C. H. Hardison.
Water Resources Research, Vol 10, No 4, p 745-752, August 1974, 3 fig, 4 tab, 5 ref.

Descriptors: *Floods, *United States, *Frequency curves, *Flood frequency, *Frequency analysis, Probability, Statistics, Peak discharge, Time series analysis.

Generalized skew coefficients for use in defining flood-frequency curves that follow log Pearson type 3 distributions are shown by isopleths on a map of conterminous United States. The generalized logarithmic skew coefficients range from 0.6 along the eastern seaboard to -0.5 in Indiana and Illinois. West of the one-hundredth meridian the coefficients range from -0.3 to 0.2 except for a small area in Nebraska where the generalized skew goes as high as 0.4. The validity of the map values is verified by a split-sampling procedure. In the west the discharge of 50- and 100-yr peaks computed by using map values of skew is more accurate than that computed by using the observed skew of a sample of 30 annual peaks. East of the Mississippi River the accuracy is even higher and approaches the equivalent of 60 annual peaks along the east coast. An equation gives the adjustment by which a T-yr peak computed by using map skew would have to be increased to give a discharge that has an average exceedance probability equal to 1/T. (Knapp-USGS)
W74-11420

FLOOD PLAIN INFORMATION, HOADLEY CREEK, KETCHIKAN, ALASKA.
Corps of Engineers, Anchorage, Alaska.
For primary bibliographic entry see Field 4A.
W74-11427

FLOOD PLAIN INFORMATION, WHIPPLE CREEK, KETCHIKAN, ALASKA.
Corps of Engineers, Anchorage, Alaska.
For primary bibliographic entry see Field 4A.
W74-11428

FLOOD PLAIN INFORMATION, CARLANNA CREEK, KETCHIKAN, ALASKA.
Corps of Engineers, Anchorage, Alaska.
For primary bibliographic entry see Field 4A.
W74-11429

FLOOD PLAIN INFORMATION, KETCHIKAN CREEK, KETCHIKAN, ALASKA.
Corps of Engineers, Anchorage, Alaska.
For primary bibliographic entry see Field 4A.
W74-11430

RIVER MILE INDEX, SEVIER LAKE BASIN, UTAH AND MINOR BASINS IN WESTERN UTAH AND EASTERN NEVADA.
Forest Service (USDA), Ogden, Utah. Intermountain Region.
For primary bibliographic entry see Field 7C.
W74-11432

HYDROLOGIC DATA FOR MOUNTAIN CREEK, TRINITY RIVER BASIN, TEXAS, 1972,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 7C.
W74-11441

HYDROLOGIC DATA FOR PIN OAK CREEK, TRINITY RIVER BASIN TEXAS, 1972,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 7C.
W74-11442

SURFACE RUNOFF AND SOIL EROSION IN FOOTHILLS OF DAGESTAN (O POVERKHNOSTNOM STOKE I SMYVE POCHV V PREDGOR'YAKH DAGESTANA),
Dagestanskii Nauchno-Issledovatelskii Institut Selskogo Khozyaistva, Makhachkala (USSR).
For primary bibliographic entry see Field 2J.
W74-11450

2F. Groundwater

HYDROGEOLOGY OF THE USSR. VOLUME 15: BASHKIR ASSR (GIDROGEOLOGIYA SSSR. TOM XV. BASHKIRSKAYA ASSR).
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrogeologii i Inzhenernoy Geologii, Moscow (USSR).
Izdatel'stvo 'Nedra', Moscow, A. V. Sidorenko, editor-in-chief, 1972. 344 p.

Descriptors: *Hydrogeology, *Groundwater, *Groundwater basins, *Aquifers, *Artesian aquifers, Confined water, Springs, Engineering geology, Geomorphology, Karst, Mountains, Structural geology, Stratigraphy, Geologic time, Water types, Water chemistry, Water utilization, Water supply, Water conservation, Natural resources.
Identifiers: *USSR(Bashkir ASSR), Tectonics.

Data summarized in Volume 15 in the series 'Hydrogeology of the USSR'(Bashkir ASSR) were based on small- and medium-scale surveys during a study of mineral deposits, groundwater regime and karst phenomena, and on geologic-engineering investigations and exploratory drilling for oil and gas. Physiographic conditions, geologic structure, and physio-geologic phenomena in the Republic are viewed as factors influencing the distribution and formation of groundwater. The Bashkir Republic is divided into two hydrogeologic regions: the Volga-Kama artesian basin and the basin containing interstitial waters of the Ural fold mountains. Twenty-five hydrostratigraphic units (aquifer horizons, aquifer complexes, and waters of sporadic occurrence) are identified in the Volga-Kama basin in deposits ranging in age from the Upper Proterozoic to the Quaternary. In the second region groundwater within the zone of regional fractures is analyzed on the basis of stratigraphic subdivisions represented by metamorphic and volcanogenic formations similar in hydrophysical properties and ranging in age from the Upper Proterozoic to the Carboniferous. Artesian waters are confined to carbonate rocks of the Upper Proterozoic, Carboniferous, and to loose formations dating from the Triassic to the Quaternary. Basic patterns in the formation, movement, and hydrochemical zonality of groundwater are given for these regions. Natural fresh groundwater resources and foreseeable supplies are computed for the Republic, and distribution of fresh groundwater in zoned. Problems of present and future groundwater use for water supply and of groundwater protection from depletion and contamination are discussed, and the role of groundwater in the development of mineral deposits is noted. (Josefson-USGS)
W74-11017

HYDROGEOLOGY OF THE USSR. VOLUME 29: KAMCHATKA, AND THE KURIL AND KOMANDORSKIYE ISLANDS (GIDROGEOLOGIYA SSSR. TOM XXIX. KAMCHATKA, KURIL'SKIYE I KOMANDORSKIYE OSTROVA).
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrogeologii i Inzhenernoy Geologii, Moscow (USSR).
Izdatel'stvo 'Nedra', Moscow, A. V. Sidorenko, editor, 1972. 364 p.

Descriptors: *Hydrogeology, *Groundwater, *Aquifers, *Engineering geology, Structural geology, Geomorphology, Seismology, Volcanoes, Gases, Water types, Freshwater, Mineral water, Thermal water, Geothermal studies, Hydrothermal studies, Water utilization, Water supply, Water conservation, Geologic mapping, Zoning.
Identifiers: *USSR(Kamchatka), *Kuril Islands(USSR), *Komandorskiye Islands(USSR), Tectonics, Balneology.

Volume 29 in the series 'Hydrogeology of the USSR' is the first summary work on the hydrogeology and engineering geology of Kamchatka, the Kurils, and Komandorskiye Islands. Kamchatka and the Kurils are the only regions of recent volcanism in the USSR and uniquely affect groundwater formation. A high degree of seismic activity and widespread development of recent tectonic disturbances, intensive mountain-building volcanic processes, and an intense geothermal regime have combined to produce extensively developed hydrothermal systems with numerous exposed sources of discharge of highly thermal waters, vapors, and gases. Besides a description of aquifer horizons, attention is directed to an examination of the patterns of distribution and formation of different types of thermal water in regions of active and extinct volcanoes. Maps, prepared on the basis of modern scientific concepts of the structural geology of Kamchatka, reflect the hydrogeologic zoning of major aquifer horizons and complexes of fresh and mineral waters and the distribution characteristics of different volcanic structures, hydrothermal systems, and artesian sedimentation basins. Natural freshwater resources and yield, present and future water supply, and balneological and thermal-energy resources are described, and characteristics and possibilities of groundwater use in prospecting for mineral deposits are examined. (Josefson-USGS)
W74-11018

HYDROGEOLOGY OF THE USSR. VOLUME 38: TURKMEN SSR (GIDROGEOLOGIYA SSSR. TOM XXXVIII. TURKMENSKAYA SSR).
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrogeologii i Inzhenernoy Geologii, Moscow (USSR).
Izdatel'stvo 'Nedra', Moscow, A. V. Sidorenko, editor-in-chief, 1972. 566 p.

Descriptors: *Hydrogeology, *Groundwater, *Groundwater basins, *Aquifers, *Engineering geology, Geomorphology, Geologic mapping, Geologic time, Water utilization, Water supply, Water conservation, Water chemistry, Water analysis, Sampling, Water types, Confined water, Freshwater, Mineral water, Thermal water, Water wells.
Identifiers: *USSR(Turkmen SSR), Tectonics.

Volume 38 in the series 'Hydrogeology of the USSR' contains a detailed description of groundwater in the Turkmen SSR in Soviet Central Asia. Results are presented of long-term investigations of hydrogeologic and geologic-engineering conditions and of basic trends in groundwater use in the national economy of the Republic. A hydrogeologic map of the Republic at a scale of 1:1,500,000 and a catalog of chemical analysis of water samples are appended. (Josefson-USGS)
W74-11019

HYDROGEOLOGY OF THE USSR. VOLUME 40: KIRGIZ SSR (GIDROGEOLOGIYA SSSR. TOM XL. KIRGIZSKAYA SSR).
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrogeologii i Inzhenernoy Geologii, Moscow (USSR).
Izdatel'stvo 'Nedra', Moscow, A. V. Sidorenko, editor-in-chief, 1971. 488 p.

Descriptors: *Hydrogeology, *Groundwater, *Groundwater resources, *Aquifers, *Engineering geology, Geomorphology, Structural geology, Geologic mapping, Stratigraphy, Geologic time, Water types, Mineral water, Industrial water, Thermal water, Confined water, Springs, Water wells, Water chemistry, Water utilization, Zoning.
Identifiers: *USSR(Kirgiz SSR), Tectonics.

Volume 40 in the series 'Hydrogeology of the USSR' is devoted to a description of hydrogeologic and engineering-geologic conditions in the Kirgiz SSR in Soviet Central Asia. A history of hydrogeologic and engineering-geologic investigations in the Republic covers a period from 1857 to the present. Basic factors influencing formation and distribution of groundwater include topography, hydrography, climate, soils and vegetation, lithology, tectonics, and geomorphology. Groundwater, including mineral, industrial, and thermal waters, is described, and role of groundwater resources in the national economy of the Republic is discussed. Two hydrogeologic provinces are identified: the Tien-Shan and Pamir-Alay, which are subdivided into regions and subregions representing specific types of artesian basins and hydrogeologic massifs. Special attention is given to the present state and prospects of groundwater use and to groundwater conservation and hydrogeology of mineral deposits. A catalog of wells and springs is appended. (Josefson-USGS)
W74-11020

AVAILABILITY OF GROUNDWATER IN THE LOWER PAWCATUCK RIVER BASIN, RHODE ISLAND,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 4B.
W74-11023

GROUNDWATER BASIC DATA FOR ADAMS AND BOWMAN COUNTIES, NORTH DAKOTA,
Geological Survey, Bismarck, N. Dak.
M. G. Croft.
North Dakota Water Commission County Ground-Water Studies 22--Part II and North Dakota Geological Survey Bulletin 65--Part II, 1974. 294 p, 2 fig, 2 plate, 9 tab, 25 ref.

Descriptors: *Basic data collections, *North Dakota, *Groundwater, *Hydrologic data, Water levels, Hydrogeology, Electrical well logging, Borehole geophysics, Water analysis, Trace elements, Aquifer characteristics, Hydraulic conductivity, Porosity.
Identifiers: Adams County(ND), Bowman County(ND).

Detailed geologic and hydrologic data were collected to use for the orderly development of water supplies for municipal, domestic, livestock, irrigation, and industrial uses in Adams and Bowman Counties, North Dakota. The data consist of geologic and hydrologic records for 910 wells and test holes; water-level measurements in 54 observation wells; lithologic and geophysical logs of 521 test holes and wells; 232 chemical analyses of groundwater; 68 chemical analyses of water from streams and reservoirs; five analyses of minor elements in water from wells and streams; three particle-size distribution graphs of sand from an aquifer; and 11 hydraulic conductivity and porosity values determined by laboratory tests. (Knapp-USGS)
W74-11024

WATER LEVELS IN ARTESIAN AND NONARTESIAN AQUIFERS OF FLORIDA, 1971-72,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 4A.
W74-11025

METEORIC WATER IN MAGMAS,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 2K.
W74-11112

HYDROGEOLOGY OF GLACIAL DRIFT, MESABI IRON RANGE, NORTHEASTERN MINNESOTA,
Geological Survey, Washington, D.C.
T. C. Winter.
Available from GPO, Washington, D C 20402, Price $2.10 paper copy. Water-Supply Paper 2029-A, 1973. 23 p, 6 fig, 1 tab, 23 ref.

Descriptors: *Hydrogeology, *Glacial drift, *Minnesota, *Water yield, Till, Aquifers, Transmissivity, Gravels, Sands, Water resources, Hydrologic data.
Identifiers: *Mesabi Iron Range(Minn).

Stratified fluvial sediments occur within the glacial drift at many places in the Mesabi Iron Range area of Minnesota. These sediments, which are important aquifers, occur extensively between the three main till units. The thickest and most extensive aquifer lies between the surficial till and the middle till unit, the bouldery till. This stratigraphic interval is greater than 50 feet thick in much of the area, and transmissivity is greater than 100,000 gallons per day per foot in some places. Glaciofluvial sediments underlying the bouldery till occur in the western half of the area and are generally less than 50 feet thick, and transmissivity is generally less than 50,000 gallons per day per foot. Surficial glaciofluvial sediments are a sources of groundwater for high-yield wells only in the eastern part of the area. Thickness of these sediments is greater than 100 feet in some places, but transmissivity is generally less than 50,000 gallons per day per foot. Practical sustained yield of aquifers in glacial drift is estimated to be as much as 40 million gallons per day from known aquifers, and assuming that the ratio of area underlain by aquifer to total area is constant for the study area (about 20% where mapped in detail), as much as 80 million gallons per day could be developed from all glacial-drift aquifers. (Knapp-USGS)
W74-11222

HYDROLOGIC ENGINEERING METHODS FOR WATER RESOURCES DEVELOPMENT: VOLUME 10. PRINCIPLES OF GROUNDWATER HYDROLOGY,
Hydrologic Engineering Center, Davis, Calif.
For primary bibliographic entry see Field 8B.
W74-11232

SOIL-SUCTION MEASUREMENTS FOR EVALUATION OF VERTICAL WATER FLOW AT GREATER DEPTHS WITH A PRESSURE TRANSDUCER TENSIOMETER,
Niedersachsisches Landesamt fuer Bodenforschung, Hannover (West Germany).
For primary bibliographic entry see Field 2G.
W74-11274

GALERKIN APPROXIMATION OF THE TIME DERIVATIVE IN THE FINITE ELEMENT ANALYSIS OF GROUNDWATER FLOW,
Princeton Univ., N.J. Dept. of Civil and Geological Engineering.
W. G. Gray, and G. F. Pinder.
Water Resources Research, Vol 10, No 4, p 821-828, August 1974. 6 fig, 2 tab, 12 ref.

Descriptors: *Finite element analysis, *Groundwater movement, Mathematical models, Simulation analysis, Numerical analysis, Time series analysis.
Identifiers: *Galerkin method.

The Galerkin method of approximation permits a high-order approximation in time as well as in space in finite element analysis of groundwater movement. The resulting approximate equations may successfully be solved by using a prismatic element with triangular cross section. The time axis runs the length of the prism and is subdivided into elements that may be linear, quadratic, or cubic. Because this formulation requires in general the solution for several time levels simultaneously, there is a resulting increase in computer time required to solve the larger matrix. Numerical experiments indicate that the selection of an optimum numerical scheme is dependent not only on the particular problem considered but also on the sequence of time steps used. (Knapp-USGS)
W74-11423

NONLINEAR TECHNOLOGICAL FUNCTIONS FOR AQUIFERS WHOSE TRANSMISSIVITIES VARY WITH DRAWDOWN,
Geological Survey, Reston, Va.
T. Maddock, III.
Water Resources Research, Vol 10, No 4, p 877-881, August 1974. 1 fig, 7 ref.

Descriptors: *Drawdown, *Transmissivity, *Aquifers, *Water level fluctuations, *Unsteady flow, Aquifer testing, Water table, Mathematical studies, Equations.
Identifiers: *Algebraic Technological Function, *Boussinesq equation.

An algebraic technological function (ATF) exists for an aquifer whose flow to wells can be remodeled by Boussinesq's equation. Drawdown is an infinite power series in pumping values, and the ATF is provided by a finite sum of the power series. The number of terms necessary for the finite sum to provide a good approximation to the infinite series depends on a ratio of drawdown to saturated thickness. The ATF can be used in optimization techniques or as a method for predicting drawdowns from pumping. (Knapp-USGS)
W74-11424

GROUNDWATER DISCHARGE FROM THE EDWARDS AND ASSOCIATED LIMESTONES, SAN ANTONIO AREA, TEXAS, 1973,
Geological Survey, Austin, Tex.
R. A. Rappmund.
Edwards Underground Water District Bulletin 32, July 1974. 9 p, 1 tab, 13 ref.

Descriptors: *Discharge(Water), *Springs, *Water wells, *Texas, Karst, Limestones, Aquifers, Water yield, Data collections, Basic data collections, Hydrologic data.
Identifiers: *Edwards aquifer(TX).

The estimated total well and spring discharge from the Edwards and associated limestones in the San Antonio area of Texas during 1973 was 838,000 acre-ft, which is the record high for the period 1934-73. The increase was due primarily to above-average springflow. The total discharge for 1973 was about 12% more than in 1972, and 53% greater than the average for 1934-72. About 37% of the total discharge came from wells, and approximately two-thirds of this discharge was from wells in Bexar County. Well discharge in 1973 was 16%

less than in 1972, while springflow increased by about 41%. (Knapp-USGS)
W74-11440

PROSPECTS OF GROUNDWATER USE IN THE NEMAN AND NERIS RIVER VALLEYS (PERSPEKTIVY ISPOL'ZOVANIYA PODZEMNYKH VOD RECHNYKH DOLIN NYAMUNAS I NERIS),
Litovskii Nauchno-Issledovatelskii Geologorazvedochnyi Institut, Vilnius (USSR).
For primary bibliographic entry see Field 4B.
W74-11447

2G. Water In Soils

INTERACTION OF TEMPERATURE AND MOISTURE ON IRON AND MANGANESE AVAILABILITY IN SOILS,
Quebec Ministere de l'Agriculture et de la Colonisation. Div. of Soils.
B. T. Cheng, G. J. Quellette, and S. J. Bourget.
Nat Can (Que). Vol 99, No 5, p 515-521. 1972.
Identifiers: *Iron *Manganese, *Soil moisture, *Soil temperature, *Canada, Soil chemistry.

The influence of moisture and temperature on Mn and Fe status in 2 Quebec (Canada) soil types was investigated under incubation room conditions. Increasing soil temperature from 272 degrees K to 305 degrees K resulted in a definite increase of exchangeable Mn and Fe in both saturated soils. The amount of exchangeable Mn in Platon soil was 2 1/2 times higher when kept at 305 degrees K and 200% field moisture capabity than when kept at 239 degrees K and dry. There was approximately 12 times more exchangeable Mn in Tilly soil samples which were subjected to the highest temperature and moisture treatments than in those subjected to low moisture and temperature. The corresponding values in the case of exchangeable Fe were 33 for Platon soil and 14 for Tilly soil. There was no significant difference in any of the data comparing 239 degrees K with 272 degrees K. Soil moisture levels of 60% field capacity or less resulted in no significant effect of soil temperature on the release of exchangeable Fe and Mn.--Copyright 1973, Biological Abstracts, Inc.
W74-10913

EFFECT OF NITROGEN AND PHOSPHORUS AT TWO MOISTURE LEVELS ON THE STATUS OF THE AVAILABLE ZN, CU, MN AND FE IN THE SOIL,
Punjab Agricultural Univ., Ludhiana (India). Dept. of Soils.
For primary bibliographic entry see Field 5B.
W74-10918

SOME FEATURES OF WATER INFILTRATION INTO SOIL DURING SPRINKLER IRRIGATION (NEKOTORYYE OSOBENNOSTI VPITYVANIYA VLAGI V POCHVU PRI DOZHDEVANII),
V. M. Sorochkin.
Pochvovedeniye, No 8, p 60-67, August 1973. 1 fig, 6 tab, 9 ref.

Descriptors: *Soil physics, *Infiltration, *Infiltration rates, *Sprinkler irrigation, *Rainfall simulators, Simulated rainfall, Precipitation(Atmospheric), Rainfall intensity, Irrigation practices, Rates of application, Soil types, Soil moisture, Soil properties, Particle size, Correlation analysis, Equations, Curves.
Identifiers: *USSR, *Transvolga Region, *Moscow Oblast.

The infiltration capacity of Chestnut loam at the southern tip of the Northern Transvolga Region and of Sod-Podzolic loam in the Moscow Oblast was investigated. Dynamics of infiltration during sprinkler irrigation is adequately approximated by the Kostyakov equation. The rate of infiltration in the absence of a free surface depends on rainfall intensity. The coefficient of proportionality between these indices ranged from 27% to 54% in individual experiments, the higher values relating to the first irrigation at low rates of application. Infiltration capacity of soil during sprinkler irrigation was found to depend on makeup of the plow layer, state of the soil surface, and soil moisture content. Sprinkling reduced the infiltration capacity of soil, reducing it by 25%-30% after the first sprinkling and by about 50% after the second. (Josefson-USGS)
W74-11013

AN IMPROVED FIELD METHOD FOR DETERMINATION OF DISCONTINUOUS CAPILLARY MOISTURE (USOVERSHENSTVOVANNYY POLEVOY METOD OPREDELENIYA VLAZHNOSTI RAZRYVA KAPILLYARNOY SVYAZI),
A. P. Kovtun.
Pochvovedeniye, No 8, p 121-123, August 1973. 1 fig, 3 tab.

Descriptors: *Soil moisture, *Capillary water, *Capillary action, *Analytical techniques, *On-site tests, Instrumentation, Forest soils, Soil properties, Particle size, Soil profiles.
Identifiers: *USSR, Soil monoliths.

An improved field method of determining discontinuous capillary moisture, based on the use of a ventilation device, is proposed and described. Compared with the method of field soil monoliths, this method can be used to determine discontinuous capillary moisture with greater accuracy throughout the entire soil profile and under any weather conditions in summer without the need of observers. Particle-size composition and hydrophysical properties of moderately-eroded Dark-Gray Forest Soil on loess in the summer of 1970 are tabulated. (Josefson-USGS)
W74-11014

RELATIONSHIP BETWEEN COEFFICIENTS OF HEAT CONDUCTIVITY AND THERMAL MOISTURE CONDUCTIVITY OF SOILS (O SVYAZI MEZHDU KOEFFITSIYENTAMI TEMPERATUROPROVODNOSTI I TERMOVLAGOPROVODNOSTI V POCHVAKH),
Akademiya Nauk Azerbaidzhanskoi SSR, Baku. Institut Pochvovedeniya i Agrokhimii.
A. P. Geryazade.
Pochvovedeniye, No 8, p 124-127, August 1973. 3 fig, 3 ref.

Descriptors: *Soil types, *Soil moisture, *Moisture content, *Thermal conductivity, Soil properties, Soil density, Bulk density, Equations.
Identifiers: USSR.

Coefficients of heat conductivity and thermal moisture conductivity of soils were determined as a function of soil moisture content and density. Empirical equations are given for these relationships. A formula is derived which expresses a linear relation between the coefficients of heat conductivity and thermal moisture conductivity for each fixed density value. Heat conductivity and thermal moisture conductivity as a function of moisture content and bulk density of Yellow Earth and Meadow Sierozem are diagrammed. (Josefson-USGS)
W74-11015

METHOD OF INVESTIGATION OF NONLINEAR FILTRATION EFFECTS (O METODIKE ISSLEDOVANIYA NELINEYNYKH FIL'TRATSIONNYKH EFFEKTOV),
Agrofizicheskii Nauchno-Issledovatelskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 7B.
W74-11016

EFFECT OF DIFFERENT LEVELS OF N-NUTRITION OF GRASS SPECIES UPON THEIR PERSISTENCY, HAY PRODUCTION AND THE CONTENT OF N-MATTER ON TEMPORARY SWAMP SITES, (IN CZECH),
F. Krajicek.
Ved Pr Vysk Ustavu Luk Pasienkov Banskej Bystrici. 8 p 97-109. 1972, Illus. English summary.

Descriptors: *Grasses, Nitrogen, Swamps.

Fourteen grass species and a meadow mixture were studied on a temporary water logged meadow site on medium soil, at a nutrient level of 100 and 200kg pure nitrients (p.n.)/ha. The study included hay production, N-matter contents, N-matter production and botanical changes of the sward. Festuca pratensis Huds., Lolium perenne L., Poa palustris L., Agrostis stolonifera L., are more efficient at a nutrient level of N 100kg p.n./ha; Dactylis glomerata L., Phleum pratense L., Poa pratensis L., Alopecurus pratensis L., at a nutrient level of 200kg p.n. N/ha. Phleum pratense L.,, Poa pratensis L., Alopecurus pratensis L. and Dactylis glomerata L. were the most persistent. At an application rate 100kg p.n. N/ha Poa palustris L., Baldingera arundinacea (L) Dumort (Phalaris) and Phleum pratense L. are best; at a 200Kg p.n. N/ha rate P. pratense L., B. arudinacea (L) Dumort and Poa pratensis L. are best.--Copyright 1974, Biological Abstracts, Inc.
W74-11108

PLANT POPULATION WITH IRRIGATED WHEAT, (IN PORTUGUESE),
Instituto de Pesquisas e Experimentacao Agropecuarias Centro-Oeste, Sete Lagoas (Brazil).
E. P. Coqueiro, and J. M. V. De Andrade.
Pesqui Agropecu Bras Ser Agron. 7 p, 177-180, 1972, English summary.

Descriptors: *Wheat, Irrigation efficiency.

Five field experiments were carried out from 1966 to 1970, in Sete Lagoas, Minas Gerais (Brazil) to determine the effect of seeding rates on grain yield of irrigated wheat. By using the averages of the five experiments in regression equations it was shown that optimal spacing was 21cm between rows and optimal population density was 256 seeds/sq m.--Copyright 1974, Biological Abstracts, Inc.
W74-11111

METHODOLOGY OF PLANT TISSUE WATER POTENTIAL DETERMINATION BY THE PSYCHROMETRIC METHOD,
Vyskymny Ustav Vodohospodarksy, Bratislava (Czechoslovakia).
For primary bibliographic entry see Field 2I.
W74-11188

MOISTURE REGIME OF MEADOW SOILS ON THE OKA RIVER FLOOD PLAIN (REZHIM VLAZHNOSTI POYMENNYKH POCHV OKSKIKH LUGOV),
Dedinovskaya Opytnaya Stantsiya po Poimennomu Lugovodstvu (USSR).
M. S. Kononov.
Pochvovedeniye, No 10, p 66-79, October 1973. 2 fig, 9 tab, 8 ref.

Descriptors: *Soil moisture, *Soil water movement, *Soil-water-plant relationships, *Grasslands, *Flood plains, Water levels, Water table, Available water, Groundwater, Capillary action, Field capacity, Recharge, Flooding, Precipitation(Atmospheric), Evapotranspiration, Wilting point, Soil properties, Particle size, Meteorology, Air temperature.
Identifiers: *USSR(Oka River).

Water regime of soils on the flood plain of the Oka River in central European Russia was investigated

in 1966-70. A stable soil moisture content, resulting from capillary recharge by groundwater, is a necessary condition for high productivity of a natural flood-plain meadow. Productivity of a meadow decreases as the water table drops. A high productivity is characteristic of meadows which are continuously recharged by groundwater to the soil surface and where the amount of available water in the upper soil layer (0-20 cm) during the growing season is above 20 mm. Meadows where capillary recharge in summer does not always reach the surface and amount of available water in the top meter layer of soil exceeds 100 mm are quite productive but experience strong yearly fluctuations in yield and require irrigation during dry periods. (Josefson-USGS)
W74-11204

FALL-WINTER DEVELOPMENT OF THE BUDS OF SOME TREES IN RELATION TO SOIL MOISTURE CONTENT, (IN BYELORUSSIAN),
Akademiya Navuk BSSR, Minsk. Inst. of Experimental Botany.
M. D. Nyestsyarovich, and A. A. Novikava.
Vyestsi Akad Navuk BSSR Syer Biyal Navuk. 1 p 5-9, 1973.

Descriptors: *Soil moisture.
Identifiers: Birch, Buds, Linden, Oak.

The length, thickness and internal structure of buds during dormancy in 30-yr pedunculate oak, cut-leaf linden, and common birch grown in Minsk, USSR, with different soil moisture content were studied in Sept.-May 1969-1971. During dormancy the length and thickness of the buds varied with soil moisture content. A slight decrease in bud length and thickness was noted following a marked decrease of air temperature (Dec., Jan.); with an increase of temperature the buds reached their original size. The buds began to increase in size in March. Growth processes did not occur during dormancy in the buds at different soil moisture levels; the number of bud elements remained constant.--Copyright 1974, Biological Abstracts, Inc.
W74-11259

A MODIFIED ION EXCHANGE TECHNIQUE FOR THE DETERMINATION OF STABILITY CONSTANTS OF METAL-SOIL ORGANIC MATTER COMPLEXES,
California Univ., Berkeley. Dept. of Soils and Plant Nutrition.
For primary bibliographic entry see Field 5A.
W74-11262

RATES OF GROWTH AND NUTRIENT UPTAKE OF IRRIGATED CORN AS AFFECTED BY N AND P FERTILIZATION,
Inst. of Agricultural Research, Volcani Bet. Dagan (Israel). Div. of Soil Chemistry and Plant Nutrition.
For primary bibliographic entry see Field 3F.
W74-11263

CROP RESIDUE, SOIL WATER, AND SOIL FERTILITY RELATED TO SPRING WHEAT PRODUCTION AND QUALITY AFTER FALLOW,
Agricultural Research Service, Sidney, Mont.
For primary bibliographic entry see Field 3F.
W74-11264

COLORIMETRIC, SEMIQUANTITATIVE TEST FOR SOIL SALINITY,
Agricultural Research Service, Riverside, Calif., Salinity Lab.
C. A. Bower.
Soil Science Society of America Proceedings, Vol 36, No 3, p 527-528, May-June, 1972. 2 tab.

Descriptors: *Salinity, *Measurement, Saline soils, Soil tests, Soil analysis, Soil chemistry, Chlorides, Chromates, Sulfates.
Identifiers: Field test.

A colorimetric, semiquantitative test for soil salinity is described based on the equivalent release of yellow CrO4 ion upon reaction of Cl and SO4 with slightly soluble Ag2CrO4 and SrCrO4, respectively, to form less soluble AgCl and SrSO4. (Skogerboe-Colorado State)
W74-11265

CALCIUM, MAGNESIUM, AND POTASSIUM SATURATION RATIOS IN TWO SOILS AND THEIR EFFECTS UPON YIELDS AND NUTRIENT CONTENTS OF GERMAN MILLET AND ALFALFA,
Ohio State Univ., Columbus.
For primary bibliographic entry see Field 3F.
W74-11269

APPLIED AND RESIDUAL NITRATE-NITROGEN EFFECTS ON IRRIGATED GRAIN SORGHUM YIELD,
Texas A and M Univ., Lubbock. Agricultural Research and Extension Center.
For primary bibliographic entry see Field 3F.
W74-11270

A LONG-TIME WATER-TABLE STUDY OF AN IRRIGATION PROJECT IN SOUTHERN ALBERTA,
Department of Agriculture, Lethbridge, (Alberta). Research Station.
For primary bibliographic entry see Field 3F.
W74-11271

NITROGEN MINERALIZATION POTENTIALS OF SOILS,
Agricultural Research Service, Beltsville, Md. Soils Lab.
G. Stanford, and S. J. Smith.
Soil Science Society of America Proceedings, Vol 36, No 3, p 465-472, May-June, 1972. 2 fig, 5 tab, 16 ref.

Descriptors: *Nutrient removal, *Nitrogen, Leaching, Nitrogen fixation, Incubation, *Mineralogy, Aerobic conditions, Water pollution sources.

Net mineralization of N in 39 widely differing soils was determined during a 30-week period at 35C, using incubation intervals of 2, 2, 4, 4, 4, 6, and 8 weeks. Mineral N was leached from the soils before the first incubation and following each of seven incubations by means of 0.01M CaC12 and a minus-N nutrient solution. Soilwater contents were adjusted by applying suction, and losses of water during incubation under aerobic conditions were negligible. With most soils, cumulative net N mineralized was linearly related to the square root of time. The pH of soils changed very little in the course of 30 weeks' incubation. Because of the generally consistent results, the data were employed in calculating the N mineralization potential, No, of each soil, based on the hypothesis that rate of N mineralization was proportional to the quantity of N comprising the mineralizable substrate. Values of No varied from about 20 to more than 300 ppm of air-dry soil. The fraction of total N comprising No varied widely among soils. Mineralization rate constants did not differ significantly among most of the soils. (Skogerboe-Colorado State)
W74-11272

DETERMINATION OF TOTAL PHOSPHOROUS IN SOILS: A RAPID PERCHLORIC ACID DIGESTION PROCEDURE,
Purdue Univ., Lafayette, Ind. Agricultural Experiment Station.
L. E. Sommers, and D. W. Nelson.
Soil Science Society of America Proceedings, Vol 36, No 6, p 902-904, November-December, 1972. 4 tab, 17 ref.

Descriptors: *Fertility, *Phosphorous, Phosphates, Nutrients, Soil chemical properties, Soil properties, Topsoil, *Pollutant identification, Water pollution sources.

Extraction and colorimetric methods were evaluated for determining total P in soils. A procedure involving simultaneous digestion of 60 soil samples with perchloric acid and determination of extracted orthophosphate with an ascorbic acid method was evaluated. Analysis of diverse soils indicated that the proposed and conventional HClO4 digestion procedures yielded essentially the same total P values; however, both HClO4 methods underestimated total P by 1-6% when compared to Na2CO3 fusion. A comparison of colorimetric orthophosphate procedures indicated the method of Murphy and Riley (1962) was suitable for determination of orthophosphate following either HClO4 digestion or Na2CO3 fusion. Determination of total P in soils by tube HClO4 digestion and estima tion of extracted P by the method of Murphy and Riley (1962) enables rapid and precise estimation of total P in a wide range of soils. (Skogerboe-Colorado State)
W74-11273

SOIL-SUCTION MEASUREMENTS FOR EVALUATION OF VERTICAL WATER FLOW AT GREATER DEPTHS WITH A PRESSURE TRANSDUCER TENSIOMETER,
Niedersachsisches Landesamt fuer Bodenforschung, Hannover (West Germany).
O. Strebel, M. Renger, and W. Giesel.
Journal of Hydrology, Vol 18, No 3/4, p 367-370, March, 1973. 2 fig, 6 ref.

Descriptors: *Soil water, *Soil moisture, *Tensiometers, Moisture tension, Soilwater movement, Available water, Measurement.
Identifiers: *Soil suction measurements.

Periodic suction measurements at greater depths can be carried out in cased boreholes using a temporarily installed pressure transducer tensiometer. The time needed to reach constant suction values depends upon the tensiometer prestressing and the soil suction, and amounts to about 15 min to 2.5 hr according to general experience. With this technique, requiring relatively low expense for instruments, the hydraulic gradient and-combined with corresponding hydraulic conductivity values-the vertical water flow can be determined at depths up to about 10 m. (Skogerboe-Colorado State)
W74-11274

MULCH AND TILLAGE RELATIONSHIPS IN CORN CULTURE,
Ohio Agricultural Research and Development Center, Wooster.
For primary bibliographic entry see Field 3F.
W74-11275

RESIDUAL EFFECTS OF N15-LABELED FERTILIZERS IN A FIELD STUDY,
Illinois Univ., Urbana. Dept. of Agronomy.
For primary bibliographic entry see Field 3F.
W74-11276

GROWTH, MINERAL COMPOSITION, AND SEED OIL OF SESAME (SESAMUM INDICUM L.) AS AFFECTED BY BORON AND EXCHANGEABLE SODIUM,
California Univ., Riverside. Dept. of Soil Science and Agricultural Engineering.
For primary bibliographic entry see Field 3C.
W74-11278

PRIMING EFFECT OF N-15 LABELED FERTILIZERS ON SOIL NITROGEN IN FIELD EXPERIMENTS,
Arizona Univ., Tucson. Dept. of Soils.
For primary bibliographic entry see Field 5B.
W74-11279

CLASSIFICATION OF SANDS IN THE TEDZHEN DELTA, (IN RUSSIAN),
Desert Inst., Ashkhabad (USSR).
M. Khudaiyarov.
Probl Osvoeniya Pustyn'. p 2, 74-78, 1973. English summary.

Descriptors: *Sands, Classification.
Identifiers: Tedzhen(USSR).

Based on field and laboratory data, sands of the river Tedzhen delta (Turkmen SSR, USSR) are characterized. They are divided into three principal groups with nine types and 26 subtypes. Coppice-mound, slightly undulating, and small hummock sands including takyr-like depressions are suitable for irrigation. The total area of these sands in the river delta is 155,000 ha. The area under barkhan, barkhan-hymmocky and barkhan-ridgy sands are suitable for phytomelioration. Ridgy, ridgy-hummocky and net sands are used and should be used in future as grazing lands.--Copyright 1974, Biological Abstracts, Inc.
W74-11376

2H. Lakes

MOLECULAR SIZE AND SPECTRAL CHARACTERIZATION OF ORGANIC MATTER IN A MEROMICTIC LAKE,
British Columbia Univ., Vancouver. Dept. of Civil Engineering.
K. J. Hall, and G. F. Lee.
Water Research, Vol 8, No 4, p 239-251, April, 1974. 10 fig, 3 tab, 36 ref.

Descriptors: *Water pollution sources, *Solid wastes, *Lakes, *Meromixis, *Biodegradation, *Leachate, *Decomposing organic water, Leaves, Fluorescence, Degradation(Decomposition), Organic matter, Molecular structure, Spectroscopy, Litter, Forest soils, Leaching, Organic compounds.
Identifiers: *Molecular weight, Lake Mary(WI), Chromophores, Aromatic compounds.

Gel filtration was used to investigate the properties of natural organic matter in Lake Mary, Vilas County, Wisconsin. The organic matter from the meromictic lake and leaf litter consisted of a series of molecular weight fractions (from longer than 50,000 to less than 700) with different color and fluorescence properties. The soluble leaf organic matter contained a higher percentage of the high molecular weight components than did lake water, demonstrating that partial degradation was occurring as it was leached from the forest floor into the lake. The degradation resulted in destruction of some of the color-producing structures and enhancement of the fluorescence in the lake organic matter. The identification of six aromatic subunits (dibutyl phthalate, vanillin, catechol, 4-hydroxyacetophenone, 3,5-dihydroxybenzoic acid, and resorcinol) in degraded organic matter demonstrated that this material contained an aromatic skeletal structure with oxygen-containing functional groups (hydroxyl and carbonyl). Different molecular size fractions possessed similar chemical subunits although infrared spectra of undegraded material suggested some differences in the aliphatic C-H stretching and bending and the C-O stretching frequencies of the intact molecules. Some evidence is provided that ether, ester, and alkyl bonds link these aromatic subunits to form part of the structure of this complex natural organic matter. (Witt-IPC)
W74-11067

CONTRIBUTIONS TO THE COMPARATIVE STUDY OF THE SEASONAL BIORHYTHM OF GONADS AND PITUITARY NUCLEI ACIDS IN CTENOPHARYNGODON IDELIA (VAL.) REARED IN PONDS OR LIVING IN NATURAL WATERS, (IN RUMANIAN),
R. Giurca.
Bul Cercet Piscic. Vol 31, No 1/2 p 45-54, 1972. Illus. (English summary).

Descriptors: *Carp, Fish physiology.
Identifiers: Ctenopharyngodon idella, Gonads, Pituitary.

Biochemical analyses were made in grass carp (C. idella, 5,9 and 11 yr old specimens), reared in ponds. The seasonal biorhythm of gonadal and pituitary RNA and DNA was determined by spectrophotometric analyses. Spectrophotometric studies were also made on 5,6,7 and 8 yr old specimens of C. idella captured in the low Danube. The characteristics of mature grass carps caught in the low Danube and the growth rate differences between fishes living in natural waters and those reared in ponds were shown. The possibility of natural spawning in the Danube of C. idella was also discussed.--Copyright 1974, Biological Abstracts, Inc.
W74-11128

THE PHOSPHORUS STATUS OF EUTROPHIC LAKE SEDIMENTS AS RELATED TO CHANGES IN LIMNOLOGICAL CONDITIONS--TOTAL, INORGANIC AND ORGANIC PHOSPHORUS,
Battelle-Pacific Northwest Lab., Richland, Wash.
For primary bibliographic entry see Field 5C.
W74-11131

THE INTENSITY OF THE FILAMENTOUS ALGAL PHOTOSYNTHETIC ACTIVITY IN THE FLOOD PLAIN LAKE NIZHNII USTUP AND MIDDLE DNIEPER, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
For primary bibliographic entry see Field 5C.
W74-11157

STUDY OF THE PHYSICO-CHEMISTRY OF A RIVER SYSTEM IN THE FRENCH MORVAN: II. SEASONAL VARIATIONS AND INFLUENCE OF RESERVOIRS ON RIVERS, (IN FRENCH),
Institut National de la Recherche Agronomique, Thonon-les-Bains (France). Station d'Hydrobiologie Lacustre.
For primary bibliographic entry see Field 2K.
W74-11159

SEASONAL AND AGE-RELATED FEEDING CHANGES OF BROOK TROUT IN LITHUANIAN SPRING BROOKS, (IN RUSSIAN),
Akademiya Nauk Litovskoi SSR, Vilnius. Institut Zoologii i Parazitologii.
A. K. Kublitskak, and V. T. Sukatskas.
Liet Tsr Moksiu Akad Darb Ser B. 1. p 175-182. 1973. English summary.

Descriptors: *Trout, Streams, Aquatic insects.
Identifiers: Chironomidae, Crustacea, Ephemeroptera, Frogs, Lithuania, Salmo Trutta, Trichoptera.

Trout (Salmo trutta m. fario) (421 units) food composition changes according to the season of the year, the age of the fish and its size. In the course of the first year trout young feed mainly on aquatic insects, namely the larvae of Chironomidae, Ephemeroptera and Trichoptera. The digestive tract of fish young also contain many specimens of adult insects. In the autumn trout young began to feed on the larger forms of benthic organisms, especially worms and crustaceans. In autumn adult trout usually feed on frogs. Fish is not important as food to trout living in spring brooks since it comprises less than 4% of the ration for the trout. Maximum indices of intestinal fill-up are found in the autumn and early spring.--Copyright 1974, Biological Abstracts, Inc.
W74-11167

EVOLUTION OF THE PLANKTON BIOCENOSIS OF LAKE ANNECY, (IN FRENCH),
Institut National de la Recherche Agronomique, Thonon-les-Bains (France). Station d'Hydrobiologie Lacustre.
G. Balvay.
Ann Hydrobiol. Vol 3, No 2, p 93-116, 1972, Illus. English summary.

Descriptors: *Plankton, Lakes.
Identifiers: France, Lake Annecy.

An ecological plankton study as carried out in 1965 and 1966 in Lake Annecy ((France) Haute-Savoie) is described. The changes in the physico-chemical water characteristics and the plankton composition indicate that the lake, already changing in 1937, had become strongly eutrophic in the mid 1960's. The construction at that time of a now partly completed peripheral sewage collecting system, which releases the treated waters below the lake's outflow, has since 1968 shown an improvement in the physico-chemical conditions and the plankton biocenosis. This improvement appears correlated with the construction and gradual extension of the lakeshore sewer.--Copyright 1974, Biological Abstracts, Inc.
W74-11168

THE DENSITY AND PRODUCTION OF FISH POPULATIONS IN THE KLICAVA RESERVOIR (CZECHOSLOVAKIA) AND THEIR CHANGES DURING THE PERIOD 1957-1970,
Slovenska Akademie Ved, Bratislava (Czechoslovakia). Lab. of Fisheries and Hydrobiology.
J. Holcik, and K. Pivnicka.
Int Rev Gesamten Hydrobiol, Vol 57, No 6, p 883-894, 1972, Illus.

Descriptors: Fish populations.
Identifiers: Czechoslovakia, Klicava reservoir.

The results of 14-yr of observations are reported concerning the species composition, ichthyomass (standing crop), total and available production, harvestable yield and balance of the fish population in the Klicava reservoir (67 ha of area) in central Bohemia. Two stages of reservoir development with regard to its fish are recognized and characterized. Some phenomena concerning the course of the ichthyomass and production, and the reasons for their fluctuations are discussed.--Copyright 1974, Biological Abstracts, Inc.
W74-11169

AQUATIC-BOG VEGETATION OF THE SAMUR RIVER BASIN, (IN RUSSIAN),
For primary bibliographic entry see Field 2I.
W74-11172

GALLTRASKET: THE GEOLOGICAL DEVELOPMENT AND PALAEOLIMNOLOGY OF A SMALL POLLUTED LAKE IN SOUTHERN FINLAND,
Helsinki Univ. (Finland). Dept. of Geology and Paleontology.
P. Alhonen.
Comment Biol Soc Sci Fenn. 57. p 1-34, 1972, Illus.

Descriptors: *Lakes, *Bottom sediments, *Diatoms, Eutrophication, Chlorophyll.
Identifiers: Finland, Galltrasket.

The bottom sediments of Galltrasket provide information on 2 main aspects of its history, viz., fluctuations in its water level and a rapid eutrophi-

cation. These fluctuations are reflected in the planktonic/littoral ratio of the subfossil cladoceran fauna, and it would appear that the bathymetric and morphometric development of Galltrasket correlate with the original Blytt Sernander climatic scheme. The changes in the proportions of diatoms inhabiting certain biotopes also reflect this climatic development. During the history of Galltrasket there were 2 high water periods, corresponding to the Atlantic and Sub-Atlantic times, and 1 clear low water period correlating with the Sub-Boreal. The dynamics of lake exosystems seems to be of general significance for Quaternary research, particularly as evidence of climatic changes. Judged by its diatom stratigraphy, Galltrasket has probably been more or less eutrophic throughout its history. A relatively rapid increase in productivity can be seen in the uppermost part of the sedimentary column, being best indicated by an abrupt rise of the p curve and a clear increase in the chlorophyll content of the sediment. Since sewage was discharged to the lake, its productivity and nutrient content have reached a higher level than during any earlier period of its history.--Copyright 1974, Biological Abstracts, Inc.
W74-11173

HALIPLIDAE, DYTISCIDAE AND GYRINIDAE OF THE ISEOPROVAGLIO (LOMBARDY) PEAT BOGS (COLEOPTERA), (IN ITALIAN),
Societe Entomologica Italiana, Genoa.
C. Ravizza.
Boll Soc Entomol Ital. Vol 104, No 8, p 137-148. 1972. Illus. English summary.

Descriptors: Bogs, Lakes.
Identifiers: Bidessus grossepunctatus, Coleoptera, Dytiscidae, Gyrinidae, Gyrinus paykulli, Haliplidae, Haliplus obliquus, Hydaticus transversalis, Iseo provaglio, Italy, Porhydrus lineatus, Beetles.

The results of research on Haliplidae, Dytiscidae and Gyrinidae inhabiting the waters of the Iseo-Provaglio peat-bogs, an intermorainic lacustrine basin, near the south-eastern shore of lake d'Iseo (Lombardy, Italy) are reported. The specimens of Coleoptera Hydroadephaga were collected all over the peat-bogs and in particular were repeated many times in 3 ponds where temperature, total hardness, O2 and pH of the water were measured at the same time. Some species which are interesting from the point of view of their distribution in Lombardy (Bidessus grossepunctatus, Porhydrus lineatus) or uncommon in the biotopes of peatbogs (Haliplus obliquus, Hydaticus transversalis, Gyrinus paykulli) are considered.--Copyright 1974, Biological Abstracts, Inc.
W74-11178

EXPERIMENTS IN THE NUTRITION OF CARP GROWING IN CAGES,
S. Shiloh, and S. Viola.
Bamidgeh. Vol 25, No 1, p 17-31, 1973. Illus.

Descriptors: *Carp, *Fish physiology.

An experimental array of wire-cages, containing 1 m3 of water each, was highly efficient for conducting nutrition experiments with carp of 250-500 g of weight, at a stocking density of 200/cage. The cages were suspended in a fish pond, near the embankment. Experimental rations, in the form of 4 mm pellets, were fed twice daily, at the rate of 4% of the weight of the carp in the fastest growing group. Every treatment was repeated in 4 cages. The duration of 1 trial was 1 mo., approximately. The fish were weighed every 10 days. All rations contained 25% crude protein, not including certain nonprotein-nitrogen compounds of experimental ingredients, but differed in their contents of metabolizable energy. The weight increments of the carp showed a high correlation with the energy content of the rations (r=0.94, after omission of one divergent value). Sterilized cow manure or poultry litter were included in some of the experimental rations at levels of 10% and 20%. Since growth rates were reduced by these high-fiber ingredients, it was concluded that fast growing carp were unable to utilize fiber as a source of energy. Soybean oil added to the pellets increased growth rate in every trial.--Copyright 1974, Biological Abstracts, Inc.
W74-11190

VAUCHERIA SPECIES FROM THE DUTCH BRACKISH INLAND PONDS 'DE PUTTEN',
Vrije Universiteit, Amsterdam (Netherlands). Afdeling Plantensystematiek.
J. Simons, and M. Vroman.
Acta Bot Neerl. Vol 23, No 3, p 177-192, 1973. Illus.

Descriptors: *Ponds.
Identifiers: Chlorophyceae, Cyanophyceae, Putten, Vaucheria.

Data are given on the distribution and periodicity of Vaucheria species (V. arcassonensis, V. canalicularis, V. compacta, V. coronata, V. cruciata, V. dillwynii, V. erythrospora, V. frigida, V. intermedia, V. litorea, V. prona, V. sescuplicaria, V. sphaerospora, V. synandra, V. terrestris and V. thuretii) in 3 main types of habitat: a ditch, drainage ditches and pond banks. At 5 stations a detailed analysis of Vaucheria growth was made. On the shores of the ponds from mean water level upwards, 4 groups of species can be discerned. The occurrence of most Vaucheria species shows a seasonal periodicity. Chlorophycene and Cyanophyceae found are also listed.--Copyright 1974, Biological Abstracts, Inc.
W74-11194

HYDROLOGICAL INVESTIGATION OF SOME OXBOW LAKES OF THE LOWER KURY, (IN RUSSIAN),
A. R. Khalilov, and I. A. Akhmedov.
Izv Akad Nauk Az SSR Ser Biol Nauk. 1. p 62-65, 1973.

Descriptors: *Zooplankton, Lakes.
Identifiers: Cladocera, Copepod, Kura(USSR).

Data are presented on the seasonal change of the total population and biomass of zooplankton (rotifer, cladocerans and copepods) of 4 oxbow lakes of the Lower Kura, USSR. The data indicate that the lakes can be converted into commercial fish farms.--Copyright 1974, Biological Abstracts, Inc.
W74-11197

SOME BACTERIOLOGICAL ASPECTS OF LAKE VILA (GERONA, SPAIN),
Instituto Nacional de Limnologia, Santo Tome (Argentina).
F. Emiliani.
Publ Inst Biol Apl Barc. 54. p 39-51. 1973. Illus. English summary.

Descriptors: *Bacteria, Lakes.
Identifiers: Spain, Thiorhodaceae, Vila Lake.

Quantitative and qualitative bacterial microflora variations in Vila Lake (Gerona, Spain), particularly Thiorhodaceae, are described. The occurrence of red waters is related to some environmental factors.--Copyright 1974, Biological Abstracts, Inc.
W74-11239

HYDROCHEMICAL TYPING OF SMALL LAKES IN ESTONIA, (IN RUSSIAN),
Akademiya Nauk Estonskoi SSR, Tartu. Inst. of Zoology and Botany.
K. Simm.
Eesti Nsv Tead Akad Toim Biol. Vol 22, No 1, p 58-67. 1973, Illus.

Descriptors: *Lakes, Classification, Mineralogy.
Identifiers: Estonia.

Since the formation of the chemical composition of lake waters takes place under conditions of delayed water-exchange, factors that determine the water-salt balance play a decisive role in the hydrochemistry of lakes, especially the flow and seepage properties of lake basins. In Estonia USSR 150 lakes were grouped into five hydrochemical types. Type A: flowing lakes on moraine catchment areas with carbonate soils; type B: flowing lakes on stagnant catchment areas; type C: nonflowing lakes on sand catchment areas; type D: nonflowing lakes on limestone catchment areas with carbonate soils; and type E: nonflowing lakes on catchment areas of upper marshlands. Typing of lakes makes it possible to distinguish the hydrochemical features of lakes. These features consist of differences in the content of minerals, biogenic and organic substances, differences in the ion composition of mineral and differences in the fractional composition of organic substances. A close correlation between water organisms and hydrochemical conditions of the environment was established.--Copyright 1974, Biological Abstracts, Inc.
W74-11268

INFLUENCE OF ORGANIC POLLUTION ON LAKE MARIUT, A HIGHLY EUTROPHICATED LAKE SOUTH OF ALEXANDRIA,
Alexandria Univ. (Egypt). Dept. of Oceanography.
For primary bibliographic entry see Field 5C.
W74-11283

DISTRIBUTION OF TOTAL MERCURY IN THE FISHES OF LAKE OAHE,
Environmental Protection Agency, Kansas City, Kans. Region VII.
For primary bibliographic entry see Field 5B.
W74-11319

MERCURY POLLUTION,
For primary bibliographic entry see Field 5B.
W74-11368

FOOD BASE OF FISH AND WAYS OF INCREASING FISH PRODUCTIVITY OF THE DNEPRODZERZHINSK RESERVOIR, (IN RUSSIAN),
Dnepropetrovskii Gosudarstvennyi Universitet (USSR). Institut Gidrobiologii.
V. L. Galinskii, I. P. Lubyanov, and G. B. Mel'Nikov.
Vopr Ikhtiol. Vol 13, No 1, p 147-154. 1973.

Descriptors: Fish, *Biomass, Reservoirs, Zooplankton.
Identifiers: Aristichthys Nobilis, Dneprodzerzhinsk.

Investigations of the food base of fishes of the Dneprodzerzhinsk reservoir (USSR) showed that it is characterized by high indices of the residual numerosity and biomass of zooplankton and benthos. For a rational and effective use of the food base it is expedient to increase the numerosity of fish species already present and to introduce Aristichthys nobilis (Rich). The fish productivity of the reservoir can be doubled by taking a number of necessary reclamation measures in the shallows.--Copyright 1974, Biological Abstracts, Inc.
W74-11387

LEGAL CONTROLS OF POLLUTION IN THE GREAT LAKES BASIN,
Ontario Water Resources Commission, Toronto.
For primary bibliographic entry see Field 5G.
W74-11417

2I. Water In Plants

ENERGETICS OF A HOST-PARASITE RELATIONSHIP AS ILLUSTRATED BY THE LEECH MALMIANA NUDA, AND THE SHORTHORN SCULPIN MYOXOCEPHALUS SCORPIUS,
Guelph Univ. (Ontario). Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W74-10940

AQUATIC-BOG VEGETATION OF THE SAMUR RIVER BASIN, (IN RUSSIAN),
D. A. Aliev, V. D. Gadzhiev, and M. G. Shikhemirov.
Uch Zap Azerb Univ Ser Biol Nauk. 1. p 11-15. 1972.

Descriptors: *Bogs, *Aquatic plants.
Identifiers: Bulrush, Reed, Reedmace, Samur river, Sedge, Sphagnum.

The aquatic-bog vegetation of the Samur river basin (USSR) is represented by bulrush-reedmace agglomerations, grass-sedge meadows, sedge meadows of primitively developed sphagnum bogs, lake vegetation, and reed-reedmace formations. Boreal species (53) predominant in the flora, followed by xerophilous (14) and Caucasian (5); 1 species was cosmopolitan. The type of the others was not established. A table is presented of the species composition of the flora with an indication of the type of life form, geographic element of the flora, and range. The small size of the boggy areas (4-10 sq m - 5000 sq m) and their scattered distribution were noted.--Copyright 1974, Biological Abstracts, Inc.
W74-11172

INFLUENCE OF WATER STRESS ON PHOTOSYNTHESIS, RESPIRATION AND LEAF GROWTH OF ZEA MAYS L.,
Agricultural Univ., Wageningen (Netherlands). Lab. of Plant Physiological Research.
J. C. Wesselius, and R. Brouwer.
Meded Landbouwhogesch Wageningen. Vol 72, No 33, p 1-15, 1972. Illus.

Descriptors: *Respiration, *Photosynthesis, Leaves, Corn(Field), *Osmotic pressure.

Maize exposed to drought showed reduced leaf elongation rate and reduced photosynthesis. Respiration rate was increased when the roots were exposed to 5C during a couple of days. Sensitivity towards drought was highest for leaf elongation rate, less for photosynthesis and lowest for the rate of respiration. The reduced rates of photosynthesis which were due to water shortage could not be enhanced by increasing the partial pressure of CO2 in the ambient air from 0.03% to 0.5%. It was concluded that a reduced biochemical activity was the limiting factor under these experimental conditions. Photosynthetic rates decreased from a relative water content of 100% to 85%. Relative water content of the leaf decreased to about 75-80% on the average, whereas the rate of photosynthesis still decreased. The osmotic pressure of the leaf increased and the rate of photosynthesis decreased during water stress. A nearly linear relationship existed between osmotic pressure of the leaf and rate of photosynthesis during a period of 5 hr after root cooling.--Copyright 1974, Biological Abstracts, Inc.
W74-11182

METHODOLOGY OF PLANT TISSUE WATER POTENTIAL DETERMINATION BY THE PSYCHROMETRIC METHOD,
Vyskymny Ustav Vodohospodarksy, Bratislava (Czechoslovakia).
L. Zila.
Biol (Bratisl). Vol 28, No 1, p 77-82, 1973. Illus.

Descriptors: *Plant tissue, *Hygrometry, Soil moisture meters.
Identifiers: Chromel, Constantan thermocouple, Peltier effect.

Determination of the water potential in plant tissues by the psychrometric method is complicated and requires a thermocouple with a measuring vessel, an efficient thermostat capable of maintaining long-term thermal stability with an exactitude of the order of 0.001C, and an evaluation galvanometer. The method and equipment described uses a chromel/constantan thermocouple with a wet connection accomplished by cooling below the dew point by the Peltier effect. The method permits assessment of the relationship between the degree of soil hydration and that of plant tissues especially under conditions of different water contents in the soil.--Copyright 1974, Biological Abstracts, Inc.
W74-11188

TURGOR DIFFERENCES AND WATER STRESS IN MAIZE AND SORGHUM LEAVES DURING DROUGHT AND RECOVERY,
Consejo Superior di Investigaciones Cientificas, Madrid (Spain). Instituto de Edafologia y Biologia Vegetal.
M. Sanchez-Diaz, and P. J. Kramer.
J Exp Bot. Vol 24, No 80, p 511-515, 1973. Illus.

Descriptors: Corn(Field), *Sorghum, Drought.
Identifiers: Pressure potential, Turgor pressure.

The pressure potentials (tugor pressure) in leaves of maize (Zea mays L.) and grain sorghum (Sorghum vulgare Pers.) plants subjected to water stress in a controlled environment were estimated from measurements of water and osmotic potentials. Changes in tugor pressure were larger in sorghum than in maize during the development of water stress and after rewatering. It is suggested that this indicates a lower cell wall elasticity in sorghum than in maize. This fact may affect some of the physiological activities of sorghum.--Copyright 1974, Biological Abstracts, Inc.
W74-11191

FREE PROLINE AND WATER DEFICIT IN PLANT TISSUES, (IN RUSSIAN),
Jozsef Attila Univ., Szeged (Hungary).
G. Palfi, M. Bito, and Z. Palfi.
Fiziol Rast. Vol 20, No 2, p 233-238, 1973. Illus. English summary.

Descriptors: *Drought.
Identifiers: Proline.

The content of free proline in plants with the optimal supply of water is usually very low (0.2-0.6 mg/g dry matter). Free proline content can rapidly rise and reach 40-50 mg during slow dehydration of the tissues. Therefore, the level of free proline ('proline test') can be used as a reliable index of the degree of water deficit of the tissues. The proline test is made by chromatographic paper impregnated with a solution of isatin and retaining its reactive ability during 2-3 yr. The proline test can be also applied for the diagnosis of 'physiological drought' due to salinization or cold soils. In combination with wilting of isolated leaves, it can be used in selection to test drought-resistance. Among 80 plant species studied, the proline test was not applicable only in those plants whose tissues contained only traces of free proline: spinach, sorrel, maize and lettuce.--Copyright 1974, Biological Abstracts, Inc.
W74-11192

WATER METABOLISM OF PLANTS DURING OXYGEN DEFICIENCY, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Inst. of Plant Physiology.
G. M. Grineva, and N. S. Petinov.
Izv Akad Nauk SSSR ser Biol. 1. p 13-25, 1973. Illus. English summary.

Descriptors: Corn(Field), Plant physiology, Metabolism, Oxygen requirements.

The roles of free space, membrane barriers and molecular structure of the protoplasm in the mechanism of water transport in isolated tissues and the root of a whole plant (corn) are discussed. The connection of the water regime of the plants with oxidative metabolism is analyzed. The character of water metabolism depends largely on the grade of O2 influence on various plant organs. Under conditions of local O2 deficiency of the roots the intensity of water metabolism decreases while leaf O2 deficiency increases intake, transport and output of water in contrast to normally aerated plants. The possible regulation mechanisms responsible for the appearance of 2 basic ranges of water metabolism intensity dependent on O 2 supply of various plant organs is discussed.--Copyright 1974, Biological Abstracts, Inc.
W74-11196

THE DENSITY OF STOMATA IN LEAVES OF DIFFERENT ECOTYPES OF PHRAGMITES COMMUNIS,
Karlova Universita, Prague (Czechoslovakia). Dept. of Plant Physiology.
J. Pazourek.
Folia Geobot Phytotaxon. Vol 8, No 1, p 15-21. 1973, Illus.

Descriptors: *Stomata.
Identifiers: Phragmites Communis.

Density and total number of leaf stomata did not differ between sites having both ecotypes present and sites with only one present. Gradients of stomatal density were encountered from base to apex of shoot. Leaf blade shape was found to be influenced by habitat.--Copyright 1974, Biological Abstracts, Inc.
W74-11253

IONIC RELATIONSHIPS OF SOIL AND PLANT: 4. ION UPTAKE IN RELATION TO MEMBRANE ACTIVITY AND MOISTURE,
S. Mattson.
Acta Agric Scand. Vol 23, No 1, p 11-16. 1973.

Descriptors: *Moisture uptake, Plant physiology, Ion exchange, Cation exchange, Peas, Wheat.
Identifiers: Peas.

The uptake of phosphate, K, Ca, and Mg at various soil moisture contents has been studied. It has been found that the Ca/K and Ca/P ratios in wheat and yellow peas increase with decreasing moisture. Evidence is presented that the activity of the cation exchanging root membrane is differentiated, the youngest root end membrane being the most active. By applying the theory of membrane equilibria an explanation of the experimental results is presented.--Copyright 1974, Biological Abstracts, Inc.
W74-11280

A NEW ECOPHYSIOLOGICAL APPROACH TO FOREST-WATER RELATIONSHIPS IN ARID CLIMATES,
I. Gindel.
W. Junk B. V., The Hague, 1973, 142p.

Descriptors: *Soil-Water-Plant Relationships Transpiration, Retardants, Forestry.

Various problems analyzed during ecological and morphoanatomical investigations are discussed, including the relation between anatomorphogenesis and the environment, the correlation between physical environmental conditions and biological properties of the plant and the consumption of moisture by plants and the role of atmospheric moisture in the water balance of the plant. Other problems discussed include the definition of the transpiration process as a function of other physiological processes, the stomatal system and its ecophysiological role and radiation and its

biological function. Chapters cover the following: absorption of atmospheric moisture by woody xerophytes; concentration of rainwater by means of plastic sheets; accepted transpiration concepts; transpiration during the season of growth; the xeromorphic properties of the leaf and their relationship to the process of transpiration; and transpiration suppressants. A pertinent bibliography are included.--Copyright 1974, Biological Abstracts, Inc.
W74-11386

2J. Erosion and Sedimentation

METHYLATION OF MERCURY IN LAKE AND RIVER SEDIMENTS DURING FIELD AND LABORATORY INVESTIGATIONS,
Wisconsin Univ., Madison.
For primary bibliographic entry see Field 5B.
W74-10924

EFFECT OF CHANGES IN WATER BALANCE OF CULTIVATED FIELDS ON EROSION PROCESSES (VLIYANIYE IZMENENIYA VODNOGO BALANSA SEL'SKOKHOZYAYSTVENNYKH POLEY NA PROTSESSY EROZII),
Akademiya Nauk SSSR, Moscow. Institut Geografii.
Ye. P. Chernyshev.
Pochvovedeniye, No 7, p 110-114, July 1973. 6 tab, 9 ref.

Descriptors: *Soil erosion, *Overland flow, *Slopes, *Cultivated lands, *Cultivation, Crop production, Erosion control, Grasslands, Spring.
Identifiers: *USSR.

Agricultural practices, which alter the magnitude and regime of overland flow, have a significant effect on soil erosion intensity. Soil erosion is discussed in relation to the characteristics of overland flow in spring. On the basis of investigations carried out at the Kursk Field Experiment Station in 1969-71 and of data available on the subject, soil erosion patterns were established during application of different agricultural practices on the water balance of cultivated fields with varying amounts of overland flow. Erosion control on slopes with a steepness of 3-5 deg in forested-steppe zones should be directed at reducing surface retention of overland flow in spring by increasing the infiltration capacity of soil. (Josefson-USGS)
W74-11011

QUALITY OF WATER AND SUSPENDED SEDIMENTS IN THE BAKSAN AND MALKA RIVERS (O KACHESTVE VODY I VZVESHENNYKH NANOSOV REK BAKSANA I MALKI),
For primary bibliographic entry see Field 5B.
W74-11012

THE RANDOM MODEL IN FLUVIAL GEOMORPHOLOGY,
Thomas J. Watson Research Center, Yorktown Heights, N.Y.
For primary bibliographic entry see Field 8B.
W74-11035

HISTORY OF METAL POLLUTION IN SOUTHERN CALIFORNIA COASTAL ZONE,
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 5A.
W74-11130

THE PHOSPHORUS STATUS OF EUTROPHIC LAKE SEDIMENTS AS RELATED TO CHANGES IN LIMNOLOGICAL CONDITIONS--TOTAL, INORGANIC AND ORGANIC PHOSPHORUS,
Battelle-Pacific Northwest Lab., Richland, Wash.
For primary bibliographic entry see Field 5C.
W74-11131

THE INFLUENCE OF THE EUTROPHIC PROCESS OF WATERS BY ERODED SOIL MATERIAL, (IN GERMAN),
For primary bibliographic entry see Field 5C.
W74-11207

EROSIONAL AND DEPOSITIONAL ASPECTS OF HURRICANE CAMILLE IN VIRGINIA, 1969,
Geological Survey, Washington, D.C.
G. P. Williams, and H. P. Guy.
Available from GPO, Washington, D C 20402, Price $1.80 paper copy. Professional Paper 804, 1973. 80 p, 57 fig, 11 tab, 65 ref.

Descriptors: *Erosion, *Sedimentation, *Hurricanes, *Virginia, *Debris avalanches, Landslides, Mudflows, Sediment transport, Disasters, Erosion rates, Floods, Channel erosion, Stream erosion, Mass wasting.
Identifiers: *Hurricane Camille(1969).

Erosion and sedimentation resulting from the worst natural disaster in central Virginia's recorded history, the flood resulting from an 8-hour deluge of about 28 inches of rain on the night of August 19-20, 1969, are described. Erosion resulted mainly from debris avalanches down the mountainsides and channel scour along streams and headwater tributaries. Total amounts of sediment yield from mountainous areas in Nelson County were about 3.2-4.6 million cubic feet per square mile, probably the equivalent of several thousand years of normal denudation. Characteristics of the debris avalanches were that (1) they usually followed preexisting depressions on hillsides and occurred on slopes greater than 35 percent, (2) the upslope tip of the avalanche scar tended to be located at the steepest part of the hillside, (3) hillsides facing north, northeast and east were more susceptible to avalanching than slopes facing other directions, and (4) debris-avalanches caused rapid and devastating surges of water and sediment in the stream channels. Slightly more than half of the total sediment contributed to the stream system was from erosion of stream channels. The types of sediment deposits were (1) debris-avalanche deposits, (2) mountain-stream channel deposits, (3) alluvial fans, (4) delta-like deposits at the junction of a stream and major highway, where water backed up during the flood due to plugging of a culvert, and (5) accretion deposits on flood plains. (Knapp-USGS)
W74-11233

SEDIMENTATION: AN INTRODUCTION TO SOLIDS FLUX THEORY,
Sheffield (England). Water Pollution Control Dept.
For primary bibliographic entry see Field 5D.
W74-11261

A NEW MEIOFAUNA SAMPLER FOR QUANTITATIVE SAMPLING IN SOFT BOTTOMS, (EIN NEUER 'MEIOFAUNASTECHER' ZUR QUANTITATIVEN PROBENNAHME IN WEICHBODEN),
Kiel Univ. (West Germany). Zoologisches Institut.
For primary bibliographic entry see Field 7B.
W74-11313

ADAPTATION OF THE POLYCHAETE NEREIS DIVERSICOLOR TO ESTUARINE SEDIMENTS CONTAINING HIGH CONCENTRATIONS OF ZINC AND CADMIUM,
Marine Biological Association of the United Kingdom, Plymouth (England). Plymouth Lab.
For primary bibliographic entry see Field 5C.
W74-11337

ADAPTATION OF THE POLYCHAETE NEREIS DIVERSICOLOR TO MANGANESE IN ESTUARINE SEDIMENTS,
Marine Biological Association of the United Kingdom, Plymouth (England). Plymouth Lab.
For primary bibliographic entry see Field 5C.
W74-11338

COPPER CONTENT IN THE INSHORE AND ESTUARINE WATERS ALONG THE CENTRAL WEST COAST OF INDIA,
National Inst. of Oceanography, Panjim (India).
For primary bibliographic entry see Field 5B.
W74-11358

ERODIBILITY OF SOILS UNDER STORM RUNOFF CONDITIONS (ERODIRUYEMOST' POCHV V USLOVIYAKH LIVNEVOGO STOKA),
Akademiya Nauk Moldarskoi SSR, Kishinev. Otdel Geografii.
Kh. P. Bogdanov, and V. V. Slastikhin.
Pochvovedeniye, No 9, p 129-131, September 1973. 1 fig, 1 tab, 18 ref.

Descriptors: *Soils, *Soil erosion, *Erosion rates, *Surface runoff, *Sprinkler irrigation, Sprinkling, Rainfall simulators, Particle size, Slopes, Erosion control.
Identifiers: *USSR(Moldavian SSR).

Accurate estimates of soil erodibility on slopes are of particular importance in Moldavia in connection with formulation of a general plan of erosion control for 1971-80 and implementation of sprinkler irrigation of large land areas. Sprinkling experiments were carried out on Gray Forest clay loam and coarse loam and on Ordinary, Calcareous, and Leached Chernozems. A relation was established between erodibility of soils and their particle-size composition. The index of soil erodibility was calculated as the mean ratio of surface runoff (in cu m) to weight of eroded soil (in metric tons) and can be used to forecast erosion intensity on different soils. Soil erosion in metric tons/ha as a function of surface runoff in cu m/ha is diagrammed, and soil particle-size composition and index of soil erodibility are tabulated. (Josefson-USGS)
W74-11449

SURFACE RUNOFF AND SOIL EROSION IN FOOTHILLS OF DAGESTAN (O POVERKHNOSTNOM STOKE I SMYVE POCHV V PREDGOR'YAKH DAGESTANA),
Dagestanskii Nauchno-Issledovatelskii Institut Selskogo Khozyaistva, Makhachkala (USSR).
S. U. Kerimkhanov, and D. U. Dzhabrailov.
Pochevovedeniye, No 9, p 132-136, September 1973. 1 fig, 2 tab, 5 ref.

Descriptors: *Soil erosion, *Surface runoff, *Slopes, Overland flow, Rain water, Snowmelt, Snow cover, Water equivalent, Precipitation(Atmospheric), Erosion control.
Identifiers: *USSR(Dagestan), Foothills.

Surface runoff and soil erosion were investigated on piedmont slopes of Dagestan in 1969 and 1972. A study of overland flow of snowmelt and rainwater was carried out on northern- and southern-exposed slopes with a steepness of 8-10 deg. Observations of snowmelt runoff were conducted in southeastern and central foothills at an elevation of 300-400 m above sea level. Soil permeability on northern-exposed slopes was 0.8-1.2 mm/min and on southern-exposed slopes, 0.5-0.7 mm/min. In 1969, runoff from southern-exposed slopes was 40% higher than from northern-exposed slopes. In 1972 there was practically no runoff from southern-exposed slopes, while on northern-exposed slopes, runoff was 1.8 mm. Despite individual years with considerable precipitation occurring in the form of snow, surface runoff and soil erosion are insignificant, which precludes a need for measures to protect soils from erosion

caused by melt water. Erosion on piedmont slopes is generally caused by runoff of rainwaters. The proportion of precipitation which contributes to overland flow in the central foothills is twice that in southeastern regions. Runoff in the northwestern part is 3.7 times greater than in the southeast. (Josefson-USGS)
W74-11450

2K. Chemical Processes

INTERACTION OF TEMPERATURE AND MOISTURE ON IRON AND MANGANESE AVAILABILITY IN SOILS,
Quebec Ministere de l'Agriculture et de la Colonisation. Div. of Soils.
For primary bibliographic entry see Field 2G.
W74-10913

SYMPOSIUM ON ENVIRONMENTAL QUALITY MONITORING; SYMPOSIUM ON SOURCES AND EVOLUTION OF THE ATMOSPHERIC AEROSOL; GENERAL PAPERS.
For primary bibliographic entry see Field 5A.
W74-10947

SULFATE AND NITRATE CHEMISTRY IN PHOTOCHEMICAL SMOG,
Rockwell Science Center, Thousand Oaks, Calif.
For primary bibliographic entry see Field 5A.
W74-10956

CHARACTERIZATION AND ANALYSIS OF AIRBORNE PARTICULATE MATERIAL BY INFRARED SPECTROSCOPY,
Argonne National Lab., Ill. Chemical Engineering Div.
For primary bibliographic entry see Field 5A.
W74-10957

USE OF CHEMICAL-SENSING ELECTRODES IN MONITORING,
Orion Research, Inc., Cambridge, Mass.
For primary bibliographic entry see Field 5A.
W74-10972

QUALITY OF WATER AND SUSPENDED SEDIMENTS IN THE BAKSAN AND MALKA RIVERS (O KACHESTVE VODY I VZVESHENNYKH NANOSOV REK BAKSANA I MALKI),
For primary bibliographic entry see Field 5B.
W74-11012

CTD SENSORS, SPECIFIC CONDUCTANCE AND THE DETERMINATION OF SALINITY,
North Carolina State Univ., Raleigh. Inst. of Marine Sciences.
For primary bibliographic entry see Field 7B.
W74-11033

ANALYSES OF PAPER MACHINE WATERS WITH ION-SPECIFIC ELECTRODES. PART I. EFFECT OF PH AND IONIC STRENGTH OF SOLUTION ON CALCIUM, CUPRIC, CHLORIDE, SODIUM, AND NITRATE ION SPECIFIC ELECTRODES,
Valmet Oy, Jyaskyla (Finland).
For primary bibliographic entry see Field 5A.
W74-11093

ANALYSES OF PAPER MACHINE WATERS WITH ION-SPECIFIC ELECTRODES, PART II. CALCIUM, CUPRIC, CHLORIDE, SODIUM AND NITRATE ION SPECIFIC ELECTRODE POTENTIALS AT VARIOUS TEMPERATURES AND IN COMPOSITE SOLUTIONS,
Valmet Oy, Jyaskyla (Finland).
For primary bibliographic entry see Field 5A.
W74-11094

AN EMPIRICAL INTERMOLECULAR POTENTIAL ENERGY FUNCTION FOR WATER,
Cornell Univ., Ithaca, N.Y. Dept. of Chemistry.
L. L. Shipman, and H. A. Scheraga.
The Journal of Physical Chemistry, Vol 78, No 9, p 909-916, April 25, 1974. 6 fig, 2 tab, 53 ref.

Descriptors: *Water structure, *Molecular structure, Thermodynamics, Water properties, Theoretical analysis, Ice, Water vapor.

An empirical intermolecular potential energy function for water has been derived, using data available from experimental and theoretical studies. These data include the lattice energy, x-ray structure, compressibility, and intermolecular vibrational frequencies of ice, the gas-phase dipole and quadrupole moments, gas-phase infrared and microwave structure of the water monomer, and the localized molecular orbital structure of the water monomer. Expressions have been derived that relate various macroscopic thermodynamic properties to the intermolecular potential energy function. The contributions of the zero-point vibrational energy of ice to several of the above properties have been examined. Potential energy versus O-O distance curves for various water dimers have been calculated and compared with large basis set ab initio quantum mechanical results. The need for an adequate treatment of the quantum mechanical nature of the intermolecular motions in the water dimer in the calculation of the second virial coefficient is discussed. (Witt-IPC)
W74-11106

THE DETERMINATION OF VANADIUM IN SEA WATER BY HOT GRAPHITE ATOMIC ABSORPTION SPECTROMETRY ON CHITOSAN AFTER SEPARATION FROM SALT,
Bologna Univ. (Italy).
For primary bibliographic entry see Field 5A.
W74-11109

FLUORIMETRIC DETERMINATION OF CARBOHYDRATES IN SEA WATER,
Kinki Univ., Osaka (Japan). Dept. of Fundamental Education.
For primary bibliographic entry see Field 5A.
W74-11110

METEORIC WATER IN MAGMAS,
Geological Survey, Denver, Colo.
I. Friedman, P. W. Lipman, J. D. Obradovich, J. D. Gleason, and R. L. Christiansen.
Science, Vol 184, No 4141, p 1069-1072, June 7, 1974. 1 fig, 2 tab, 12 ref.

Descriptors: *Magmatic water, *Meteoric water, *Precipitation(Atmospheric), *Oxygen isotopes, Lava, Water types, Groundwater, Nevada, Colorado, Isotope studies, Igneous rocks, Rhyolites, Petrology.
Identifiers: *Magmas.

Oxygen isotope analyses of sanidine phenocrysts from rhyolitic sequences in Nevada, Colorado, and the Yellowstone Plateau volcanic field show that delta (18)O in these magmas decreased as a function of time. This decrease may have been caused by isotopic exchange between the magma and groundwater low in (18)O. For the Yellowstone rhyolites, 7000cu km of magma could decrease in delta (18)O by 2/mil in 600,000 years by reacting with water equivalent to 3mm of annual precipitation, which is only 0.3% of the present precipitation in this region. The possibility of reaction between large magmatic bodies and meteoric water at liquidus temperatures has major implications in the possible differentiation history of the magma and in the generation of ore deposits. (Brown-IPC)
W74-11112

STUDY OF THE PHYSICO-CHEMISTRY OF A RIVER SYSTEM IN THE FRENCH MORVAN: II. SEASONAL VARIATIONS AND INFLUENCE OF RESERVOIRS ON RIVERS, (IN FRENCH),
Institut National de la Recherche Agronomique, Thonon-les-Bains (France). Station d'Hydrobiologie Lacustre.
J. Feuillade.
Ann Hydrodiol. Vol 3, No 2, p 117-140. 1972. Illus. English summary.

Descriptors: *Lakes, *Reservoirs, Water chemistry, Phytoplankton, Rivers.
Identifiers: Ammonia, Iron, Magnesium, Nitrogen, Phosphorus.

This work is the continuation of one carried out in 1966-67 on lakes only. The rivers have a torrential aspect in the zone studied. The Settons reservoir warms the water getting through but retains P during maximal phytoplankton growth. This lake also retains nitrate N and releases ammonia. The Chaumecon reservoir which is deep and with effluent water from the base of the dam cools water getting through it between winter and late summer. This lake is an Fe and P trap. It releases in the river byproducts from organic matter in the oxidized form: nitrate N and sulfate. The Crescent reservoir is deep but only gives a poor flow of deep water in the river. It is without important thermic activity on these waters. The waters flowing from this lake are much enriched with dissolved substances, specially with reduced Fe. All correlation coefficients and canonic variables were calculated with a computer. Some correlations are pointed out by graphic methods. Flow variations are of little importance on water physico-chemistry. The Chaumecon reservoir has a good action in the water flowing through it. The Crescent reservoir has a noxious action.--Copyright 1974, Biological Abstracts, Inc.
W74-11159

DISSOLVED OXYGEN AND PRIMARY PRODUCTION IN HYPERTROPHIC SHALLOW LAKES IN THE DISTRICT OF THE RIVER HAVEL,
Wasserwirtschaftsdirektion Havel, Potsdam (East Germany).
L. Kalbe.
Int Rev Gesamten Hydrobiol. Vol 57, No 6, p 825-862, 1972, Illus. English summary.

Descriptors: *Dissolved oxygen, *Lakes, Phytoplankton, Ducks(Domestic), *Primary productivity.
Identifiers: East Germany, Havel River.

Three shallow lakes with domestic ducks in the District of the River Havel (East Germany) in the years 1966-1969 were studied. In consequence of large imports of nutritive substances from domestic ducks and waste water, large amounts of N salts and P were found at all times of the year. The diurnal curves show important differences of the amount of dissolved O2 at night compared to that during the day. The maximum daily primary production in 1 of these lakes, the Grossin-See, was 10.9 gC/cu m. The entire population is the cause of long-term tendencies for the amount of dissolved O2 to increase and decrease. This is an expression of the variable activity of the phytoplankton. Some possible methods for primary production measurements were used. Odum's method of interpretation of diurnal curves should be preferred.--Copyright 1974, Biological Abstracts, Inc.
W74-11170

A STUDY ON THE FRACTIONATION OF ORGANIC MATTER IN NATURAL WATER BY ULTRAFILTRATION TECHNIQUES,
National Swedish Environment Protection Board, Uppsala.
A. Wilander.
Schweiz Z Hydrol. Vol 34, No 2, p 190-200, 1972. Illus.

Descriptors: *Organic matter, *Distillation, *Filtration.

Ultrafiltration is one method for discrete separation of high and low molecular weight organic substances in natural water. Diaflo filters with nominal molecular weight cutoffs at 1000 and 10,000 have been used. The UM 2 filter has been specially studies with respect to retention of inorganic and organic substances. With the described procedure the retention varied from -4% for Na to 72% for Mg. The binding of Ca by organic substances in natural water is between 1 and 10%. The retention of some nutrients was also studied, varying from 27% for nitrate to 77% for phosphate. The retention of natural organic matter was 66-94% when measured as permanganate comsumption and 84-99% when measured as absorbance. With the UM 10 filter the mean retention of colored matter was 95 and with PM 10 36%.--Copyright 1974, Biological Abstracts, Inc.
W74-11187

COLORIMETRIC, SEMIQUANTITATIVE TEST FOR SOIL SALINITY,
Agricultural Research Service, Riverside, Calif., Salinity Lab.
For primary bibliographic entry see Field 2G.
W74-11265

HYDROCHEMICAL TYPING OF SMALL LAKES IN ESTONIA, (IN RUSSIAN),
Akademiya Nauk Estonskoi SSR, Tartu. Inst. of Zoology and Botany.
For primary bibliographic entry see Field 2H.
W74-11268

POTENTIOMETRIC MEASUREMENT OF COPPER IN SEAWATER WITH ION 1 = 1 SELECTIVE ELECTRODES,
Texas Instruments, Inc., Dallas.
For primary bibliographic entry see Field 5A.
W74-11350

APPLICATION OF CHELATING ION EXCHANGE RESINS FOR TRACE ELEMENT ANALYSIS OF GEOLOGICAL SAMPLES USING X-RAY FLUORESCENCE,
Georgia Univ., Athens. Dept. of Geology.
For primary bibliographic entry see Field 5A.
W74-11364

DESIGN AND EVALUATION OF A VIDICON SCANNING SPECTROMETER FOR MOLECULAR ABSORPTION AND ATOMIC EMISSION SPECTROMETRY,
Purdue Univ., Lafayette, Ind. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W74-11394

FILTER PORE-SIZE EFFECTS ON THE ANALYSIS OF AL, FE, MN, AND TI IN WATER,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 5A.
W74-11421

COMPARISON OF OBSERVED AND CALCULATED CONCENTRATIONS OF DISSOLVED AL AND FE IN STREAM WATER,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 5A.
W74-11422

DETERMINATION OF TRACE METALS IN SODIUM DITHIONITE-CITRATE EXTRACTS OF SOILS AND SEDIMENTS BY ATOMIC ABSORPTION,
Geological Survey, Menlo Park, Calif. Water Resources Div.
For primary bibliographic entry see Field 5A.
W74-11425

2L. Estuaries

A NATIONAL OVERVIEW OF EXISTING COASTAL WATER QUALITY MONITORING.
Interstate Electronics Corp., Anaheim, Calif. Oceanics Div.
For primary bibliographic entry see Field 5A.
W74-11010

DATA BANK INVENTORY: VOL. II--CHESAPEAKE BAY, EDITION 1, 1949 THROUGH 1970,
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
C. Feister, and M. Karweit.
Available from NTIS, Springfield, Va. 22161 AD-761 184, Price $3.50 printed copy; $2.25 microfiche. Data Bank Report 2, Reference 73-5, January 1973. 45 p, 3 append. ONR Contract N00014-67-A-0163-0006.

Descriptors: *Data collections, *Hydrologic data, *Chesapeake Bay, *Information exchange, Data storage and retrieval, Oceanography, Basic data collections.

The Chesapeake Bay Institute (CBI) maintains a bank of information consisting of all oceanographic data collected by CPI on the Chesapeake Bay and its tributaries. Since 1949 CBI has gathered data both for specific projects and for general surveys. Much of it has been published as individual cruise reports, but never collated in a way to make it generally accessible for secondary use. Recently a complete reorganization of this data bank was undertaken to promote better utilization of its contents. (Knapp-USGS)
W74-11026

LONG WAVE EXCITATION IN HARBOURS--AN ANALYTICAL STUDY,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W74-11031

COMPUTATION OF FLOW THROUGH MASONBORO INLET, N.C.,
North Carolina State Univ., Raleigh. Dept. of Civil Engineering.
M. Amein.
Sea Grant Publication 73-15, July 1973. 45 p, 14 fig, 3 tab, 17 ref. NOAA Grants 2-35178 and 04-3-158-40.

Descriptors: *Open channel flow, *Inlets(Waterways), *North Carolina, Estuaries, Tides, Streamflow, Channels, Lagoons, Mathematical models, Finite element analysis, Unsteady flow.
Identifiers: *Masonboro Inlet(NC).

The flow through the Masonboro Inlet, North Carolina system was computed by means of a numerical simulation model based on the equations of unsteady flow which represent the laws for the conservation of mass and momentum. The Masonboro Inlet system is a complex arrangement of channels connecting the coastal waterways to the Atlantic Ocean. An implicit method was used to find the solutions for the finite difference equations. The method requires that the basic equations be satisfied at all locations simultaneously. A comparison of the computed results with the field observations demonstrates the accuracy, reliability, and efficiency of the method. It is believed that the simulation model can handle other inlets, which are generally much simpler than the Masonboro Inlet, with little difficulty. (Knapp-USGS)
W74-11036

REPRODUCTION OF THE BLOODWORM (GLYCERA DIBRANCHIATA) IN THE SHEEPSCOT ESTUARY, MAINE,
National Marine Fisheries Service, West Boothbay Harbor, Maine. Dept. of Sea Shore Fisheries.
E. P. Creaser, Jr.
J Fish Res Board Can. Vol 30, No 2, p 161-166, 1973. Illus.
Identifiers: *Bloodworms, Crangon-septemspinosus, *Estuaries, Glycera-dibranchiata, Larus-argentatus, *Maine(Sheepscot estuary), *Reproduction, *Food chains, Egg growth.

The population of bloodworms (G. dibranchiata) at Wiscasset, Maine, is composed of five assumed year-classes. Most spawners are probably large three- and four-yr-old blood-worms. At Wiscasset eggs are released into the coelom at a size of 21 micrometer. The rate of egg growth varies with season. In June 1-10 million eggs are spawned at a diameter of 151-160 micrometer. A bottom temperature in excess of 13C seems necessary for spawning to occur. Spawning occurs in the afternoon, between 2 hr before and 1 hr after high water. Males emit streams of sperm while swimming at the surface; females swim rapidly at the surface and suddenly rupture, liberating all the eggs at once. Females are slightly more abundant than males in the flats. Spawning bloodworms are preyed upon by herring gulls (Larus argentatus) and striped bass (Monone saxatilis), whereas spent epitokes are consumed by the mud shrimp (Crangon septemspinosus), which in turn is eaten by striped bass.--Copyright 1973, Biological Abstracts, Inc.
W74-11043

MERCURY ORGANIC MATTER ASSOCIATIONS IN ESTUARINE SEDIMENTS AND INTERSTITIAL WATER,
Florida State Univ., Tallahassee. Dept. of Oceanography.
For primary bibliographic entry see Field 5B.
W74-11122

MAJOR PORT DEVELOPMENTS AT RICHARDS BAY WITH DUE REGARD TO PRESERVING THE NATURAL ENVIRONMENT,
Council for Scientific and Industrial Research, Pretoria (South Africa).
J. A. Zwamborn, and C. H. Cawood.
The Civil Engineer in South Africa, Vol 16, No 2, p 79-85, February, 1974. 6 fig, 6 ref.

Descriptors: *Industrial production, *Sea water, *Bays, Marine animals, Tidal flow, Ports, Channels, Flood relief, Environmental effects.
Identifiers: *South Africa(Richards Bay), Environmental protection.

South Africa has experienced considerable industrial growth which resulted in the need for more and better harbor facilities. Particularly in view of the transport of bulk materials, Richards Bay was chosen as the most suitable site for the establishment of deep water port to serve the existing and future industrial areas of the Transvaal, the Northern Free State and Natal. Richards Bay consists of a large shallow bay connected to the sea by a shallow estuary channel through which tidal flow and marine organisms can move freely. Since only half the bay area was required for harbor development, the Natal Provincial Administration proposed preserving the southern half of the bay as a nature reserve. A levee was constructed to separate the harbor area from the southern half of the bay, and at the same time to provide access to the bluff area on the south side of the harbor entrance channel and reduce siltation in the harbor basins. Time limitations precluded the model testing an an estuarine flood relief channel direct to the sea. Provision was made for both tidal exchange between the nature reserve and the harbor, and for flood discharge, by the inclusion of a

large flood relief structure in the levee. An alternative, ecologically much more attractive solution of a new estuary channel excavated through the dunes directly to the sea became an economically feasible proposition. (Prague-FIRL)
W74-11125

WELL-MIXED ESTUARIES WITH NONLINEAR RESISTANCE,
Syracuse Univ., N. Y. Dept. of Civil Engineering.
W-H. Li.
Journal of Hydraulic Research, Vol 12, No 1, p 83-97, 1974. 6 fig, 1 tab, 4 ref, 2 append.

Descriptors: *Estuaries, *Tidal effects, *Roughness(Hydraulic), Tides, Water levels, *Flow resistance, Currents(Water), Mathematical models, Mixing, Mannings equation, Equations, Numerical analysis.
Identifiers: *Well-mixed estuaries.

Two equations which take into account nonlinear flow resistance are proposed for solving for various tidal and channel conditions in natural estuaries. These equations are intended for well-mixed estuaries with small fresh-water flow and negligible diurnal inequality. Two functions in the equations that depend on the estuary geometry are determined from linear ordinary differential equations. Flow resistance, expressed by Manning's formula, requires knowing the roughness coefficient. The effects of roughness and tidal action are separated from the effects of the estuary geometry so that repeated numerical computations with a computer can be avoided when investigating several tidal amplitudes or channel roughnesses. (Humphreys-ISWS)
W74-11137

ENVIRONMENTAL EFFECTS OF PETROCHEMICAL WASTE DISCHARGES ON TALLABOA AND GUAYANILLA BAYS, PUERTO RICO,
Environmental Protection Agency, Athens, Ga. Surveillance and Analysis Div.
For primary bibliographic entry see Field 5C.
W74-11228

TYPICAL LEVEL OF LEAD IN MYTILUS GALLOPROVINCIALIS LMK FROM THE GULF OF TRIESTE,
Trieste Univ. (Italy).
For primary bibliographic entry see Field 5B.
W74-11290

A SEASONAL SURVEY OF THE FISHES IN THE MYSTIC RIVER, A POLLUTED ESTUARY IN DOWNTOWN BOSTON, MASSACHUSETTS,
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 5B.
W74-11302

ECOLOGICAL IMPLICATIONS OF HEAVY METAL IN FISH FROM THE SEVERN ESTUARY,
Bath Univ. (England).
For primary bibliographic entry see Field 5C.
W74-11325

THE OCCURRENCE OF SOME TRACE METALS IN COASTAL ORGANISMS WITH PARTICULAR REFERENCE TO THE SOLENT REGION,
Southampton Univ. (England). Dept. of Oceanography.
For primary bibliographic entry see Field 5B.
W74-11332

ADAPTATION OF THE POLYCHAETE NEREIS DIVERSICOLOR TO ESTUARINE SEDIMENTS CONTAINING HIGH CONCENTRATIONS OF ZINC AND CADMIUM,
Marine Biological Association of the United Kingdom, Plymouth (England). Plymouth Lab.
For primary bibliographic entry see Field 5C.
W74-11337

ADAPTATION OF THE POLYCHAETE NEREIS DIVERSICOLOR TO MANGANESE IN ESTUARINE SEDIMENTS,
Marine Biological Association of the United Kingdom, Plymouth (England). Plymouth Lab.
For primary bibliographic entry see Field 5C.
W74-11338

STUDIES ON THE MECHANISMS OF RED TIDE OCCURRENCE IN HAKATA BAY, 3. THE CHARACTERISTICS OF EFFECTIVE BOTTOM MUD AND ITS GEOGRAPHICAL DISTRIBUTION PATTERN, (IN JAPANESE),
Kyushu Univ., Fukuoka (Japan). Faculty of Agriculture.
For primary bibliographic entry see Field 5C.
W74-11341

COPPER CONTENT IN THE INSHORE AND ESTUARINE WATERS ALONG THE CENTRAL WEST COAST OF INDIA,
National Inst. of Oceanography, Panjim (India).
For primary bibliographic entry see Field 5B.
W74-11358

MONITORING TOXAPHENE CONTAMINATION IN A GEORGIA ESTUARY,
Georgia Univ., Sapelo Island. Marine Inst.
For primary bibliographic entry see Field 5B.
W74-11443

3. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

MEMBRANES FOR REVERSE OSMOSIS,
United Kingdom Atomic Energy Authority, London (England). (assignee).
For primary bibliographic entry see Field 5D.
W74-10932

SYSTEMS ANALYSIS OF A MULTI-STAGE TUBULAR MODULE REVERSE OSMOSIS PLANT FOR SEA WATER DESALINATION,
California Univ., Los Angeles. School of Engineering and Applied Science.
J. W. McCutchan, and V. Goel.
Desalination, Vol 14, No 1, p 57-76, February 1974. 10 fig, 1 tab, 29 equ, 17 ref.

Descriptors: *Desalination plants, *Dynamic programming, *Operating costs, Water costs, Water quality control, Sea water, Simulation analysis, Equations, Digital computers, *Reverse osmosis, Systems analysis, Mathematical modeling, *California.
Identifiers: *La Jolla(Cal), *Cost minimization.

A study is described to define single and multistage tubular module reverse osmosis systems for sea water application and to optimize these systems for minimum cost operation. Such a system has been analyzed based on current cellulose acetate membrane technology. Field data were recorded over a wide range of operating conditions on UCLA's tubular module operating on sea water feed at La Jolla, California. These data are used to develop mathematical equations to predict membrane performance under varying conditions. Cost equations are derived based on the actual costs incurred at La Jolla. A dynamic programming model is developed and solved on a digital computer, to arrive at optimum operating parameters for two- and three-stage designs. A variable membrane permeability model is used to simulate operating conditions along the tube length within a stage, to arrive at optimum membrane curing temperatures. Results show that the lowest cost water would be produced by the single-stage design if operating pressures as high as 1500 psi are used. However, two-stage operation has certain inherent advantages which could be weighed against the lower cost of single-stage operation. (Bell-Cornell)
W74-11039

MULTISTAGE EVAPORATOR,
Davidson (Maxwell) Evaporators Ltd., West Bromwich (England).
M. W. Davidson.
U.S. Patent No. 3,808,104, 5 p, 7 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 921, No 5, p 2042, April 30, 1974.

Descriptors: *Patents, *Water vapor, *Distillation, *Desalination, *Evaporators, *Water treatment, Equipment, Condensation, Evaporation.
Identifiers: Multistage evaporators.

Each stage includes one or more evaporating passages through which the liquid to be evaporated is caused to descend. The evaporating passages are flanked by passages to which heating fluid is supplied. The heating fluid condenses, giving up heat to the liquid to be evaporated, and condenses in reservoirs which are divided by partitions to form barometric leg arrangements. The condensed heating fluid in the reservoirs maintains a pressure differential between successive stages. A collector tray beneath each stage collects residual unevaporated liquid and delivers it to the evaporating passages of the next stage. The tray also collects condensed heating fluid overflowing from barometric legs and delivers this to the heating passages of the next stage. The tray includes apertures to allow vapor to pass from the evaporating passages of one stage to the heating passages of the next stage. (Sinha-OEIS)
W74-11050

EVAPORATING METHOD AND EVAPORATING APPARATUS,
Sasakura Engineering Co. Ltd., Osaka (Japan). (assignee).
T. Sasakura, and T. Kurosaka.
U.S. Patent No 3,809,623, 4p, 9 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 922, No 1, p 273, May 7, 1974.

Descriptors: *Patents, *Desalination, *Evaporation, *Distillation, *Condensation, Brines, Seawater, Brackish water, Potable water, *Evaporators.
Identifiers: Multistage flash evaporation.

The shell of the multistage flash evaporating apparatus is divided into evaporating chambers which are maintained at lower pressure from stage to stage with many partitions. An opening is provided at the lower part of each partition which forms a brine passage between adjacent stages and a first throttle concerned with the generation of flash evaporation. Flash evaporation is repeated by circulating the brine continuously through a series of evaporating chambers ranging from a stage of relatively high temperature and high pressure to a stage of lower temperature and lower pressure. The brine in one evaporating chamber flows into a box with the pressure somewhat reduced. Vapor is generated in correspondence with degree of pressure drop thereby producing a two-phase flow of liquid and vapor. The vapor ascends as it is separated from the residual brine, and it enters into a condenser where it is collected as product distilled water. (Sinha-OEIS)
W74-11396

DESALINZATION SYSTEM,
A. Griffin.
U.S. Patent No 3,824,156, 2 p, 9 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 924, No 3, p 624, July 16, 1974.

Descriptors: *Patents, *Desalination, *Water treatment, Water quality control, *Condensation, *Distillation, Seawater, Equipment, Separation techniques.

The apparatus consists of a station to which salt seawater is piped, the station having electric generators driven by a turbine powered by the incoming saltwater. The station includes boiler tanks in which the saltwater is boiled so that the stream can be piped to a condenser. From there distilled, pure freshwater is piped to a freshwater storage reservoir. The electric generator supplies energy to electric heaters for boiling the saltwater, driving pumps and powering all the equipment at the station. (Sinha-OEIS)
W74-11400

MULTIPLE EFFECT EVAPORATING APPARATUS,
Sasakura Engineering Co. Ltd., Osaka (Japan).
M. Takada.
U.S. Patent No 3,824,155, 3 p, 7 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 924, No 3, p 624, July 16, 1974.

Descriptors: *Patents, *Evaporation, *Desalination, *Distillation, *Water treatment, Sea water, Heat transfer, Potable water, Condensation, Equipment, *Evaporators.

The operation of the multiple effect evaporating apparatus is as follows: Seawater introduced from a piping, passing through the condenser, cools and condenses the vapor produced in the last effect and then is discharged from an exhaust pipe. The exhaust pipe is provided with a branch pipe through which a portion of the sea-water to be exhausted is sent as feed water, via a piping into a brine will. The brine thus mixed with the sea-water is pumped from the brine well by a circulating pump, a portion of which is supplied to the preheaters and the remainder is exhausted out of the system via an exhaust pipe. Where necessary, injection of scale inhibitor, deaeration, etc. will be carried out as in the case of a conventional seawater evaporating method. It is also possible to make only fresh sea-water flow through the preheater as circulating brine, without mixing it with concentrated brine. Thus, distilled water repeats flash evaporation and condensation and is finally flashed into the distilled water chamber of the lowermost stage. The flashed-off vapor in this chamber is combined with the vapor generated from the brine in the last effect and then condensed by the condenser which is supplied with the afore-mentioned feed water. Resultant condensate accumulates in the distilled water chamber and then is withdrawn by a distilled water pump through a piping. (Sinha-OEIS)
W74-11401

EVAPORATING METHOD AND APPARATUS,
Sasakura Engineering Co. Ltd., Osaka (Japan).
M. Takada, and K. Hamahata.
U.S. Patent No 3,824,154, 4 p, 2 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 924, No 3, p 624, July 16, 1974.

Descriptors: *Patents, *Desalination, *Distillation, *Evaporation, *Water treatment, Equipment, Sea water, Potable water, Heat transfer, Condensation, Evaporators.

A process for evaporating and distilling liquids such as brine or sea water provides effective units operable at differing pressures vertically one on top of the other, with units of higher pressure positioned succeedingly higher. The uppermost of the effective units has a heating tube supplied by an external heating source and an upper brine well which has jet holes. The lowermost effective unit has a brine well and a condenser with a cooling tube. There are horisontal partition walls separating adjacent effective units, each of the partition walls forms a brine well and has a plurality of jet holes. Each of the effective units other than the uppermost has a horizontal heat transfer tube bundle including at least one heat transfer tube positioned below the jet holes of the next upper partition wall. Each of the effective units other than the lowermost effective unit has a vapor releasing chamber communicating with the interiors of the heat transfer tubes and with the preheating chamber of the succeeding effective unit. The lower most effective unit has a vapor releasing chamber surrounding the condenser which comprises an initial preheater tube. (Sinha-OEIS)
W74-11402

DISTILLATION OF SALINE WATER BY DIRECT CONTACT HEAT EXCHANGE WITH IMMISCIBLE LIQUID,
Secretary of the Interior, Washington, D.C.
K. C. D. Kickman.
U.S. Patent No 3,821,089, 3 p, 2 fig, 13 ref; Official Gazette of the United States Patent Office, Vol 923, No 5, p 1886, June 28, 1974.

Descriptors: *Patents, *Distillation, *Desalination, *Heat transfer, *Water treatment, Saline water, Sea water, Condensation.
Identifiers: *Heat exchange, Ambiphyllic agents, Immiscible oils.

Steam is directly condensed with a cool immiscible oil admixture with an ambiphyllic agent. To overcome the formation of scale on heat transfer surfaces during saline water distillation, it has been proposed to employ an immiscible heat transfer liquid in the system wherein steam is generated from the saline feed water by directly contacting it with a hot liquid usually referred to as a hot immiscible oil. During this heat exchange, the oil is cooled. After separation from the residual feed water, the cooled oil is brought into direct contact with the generated steam to condense the steam and simultaneously heat the oil again in preparation for the next distillation cycle. (Sinha-OEIS)
W74-11414

3B. Water Yield Improvement

WARM FOG AREA SEEDING STUDIES,
Meteorology Research, Inc., Altadena, Calif.
T. B. Smith, and D. M. Takeuchi.
Available from NTIS, Springfield, Va. 22161 as AD-767 297, Price $2.75 printed copy; $2.25 microfiche. Air Force Cambridge Research Laboratories, Bedford, Massachusetts, Technical Report 73-0437, July 20, 1973. 18 p, 8 fig, 1 tab, 1 append. Contract No F 19628-72-C-0236.

Descriptors: *Fog, *Cloud seeding, *Weather modification, Model studies, Aircraft.
Identifiers: *Warm fog, *Fog dispersal.

The effects of area seeding for warm fog dispersal were tested with sized urea particles. The area seeding concept was modeled and planned on the basis of a uniform, known wind environment. Difficulties were encountered during the tests due to shifting wind patterns and wind velocities which were higher than indicated in the observational data. The area concept is difficult to carry out operationally and may be limited to uniform, predictable fog environments. (Knapp-USGS)
W74-11032

WARM FOG DISPERSAL TECHNIQUES,
Navy Weather Research Facility, Norfolk, Va.
D. M. Feit, E. E. Hindman, II, D. B. Johnson, and P. M. Tag.
Available from NTIS, Springfield, Va 22161 as AD-760 674, Price $3.50 printed copy; $2.25 microfiche. Technical Paper No 1-69 (Rev), October 1970. 46 p, 6 fig, 3 tab, 36 ref.

Descriptors: *Weather modification, *Fog, Cloud physics, Particle size, Clouds, Cloud seeding.
Identifiers: *Fog clearing.

The results of warm-fog dispersal studies at Navy Weather Research Facility, and elsewhere are summarized. Four different clearing techniques are examined: heating, helicopter or aircraft mixing, hydroscopic treatments, and water-droplet sweepout. The application of heat or mixing by aircraft can result in the total conversion of fog to water vapor. Hydroscopic treatments and water-droplet sweepout on the other hand, achieve visibility improvement by modifying the droplet spectra and by the precipitation of a sizeable portion of the liquid water from the treated zone. A warm fog is normally defined as any fog having a temperature above O deg C. In actual practice, however, fogs having temperatures down to about -5 deg C may be treated using 'warm-fog' techniques since 'supercooled' techniques are not practical until the temperature drops appreciably below O deg C. (Knapp-USGS)
W74-11200

A SUMMARY OF THE U.S. NAVY PROGRAM AND FY 1970 PROGRESS IN WEATHER MODIFICATION AND CONTROL.
Navy Weather Research Facility, Norfolk, Va.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-769 544, Price $5.25 printed copy; $2.25 microfiche. Technical Paper No 24-70, December 1970. 55 p, 20 fig.

Descriptors: *Weather modification, *Cloud physics, Cloud seeding, Climatology, Meteorology, Fog, Military aspects, Research and development.
Identifiers: *US Navy.

Weather modification research of the U.S. Navy is reviewed. The Office of Naval Research supports fundamental research in cloud physics at various universities, in a program intended to eliminate specific gaps in knowledge. The Naval Research Laboratory is responsible for conducting basic cloud physics research for the design and development of improved cloud-physics instrumentation, and for carrying out a measurement program that will provide information about the natural and artificially produced variability of microphysical processes. The Naval Weapons Center develops, tests and perfects the actual techniques and agents employed in field experiments, and carries out a broad spectrum of supporting laboratory work in physical chemistry. The Navy Weather Research Facility has responsibilities in the design, coordination and evaluation of Navy weather modification experiments, and meteorology. The Naval Air Systems Command has cognizance for Navy meteorological development, including weather modification. The Naval Weather Service Command is the operational arm of the Navy's meteorological organization. (Knapp-USGS)
W74-11203

ATMOSPHERIC WATER RESOURCES MANAGEMENT PROGRAM,
Montana State Univ., Bozeman. Dept. of Earth Sciences.
A. B. Super, C. A. Grainger, J. T. McPartland, V. L. Mitchell, and R. H. Yaw.
Available from NTIS, Springfield, Va 22161 as PB-218 705, Price $6.00 printed copy; $2.25 microfiche. Final Contract Report (Part I), December 15, 1972. 425 p, 126 fig, 23 tab, 91 ref, 8 append. USBR Contract 14-06-D-6798.

Descriptors: *Cloud seeding, *Weather modification, *Montana, Meteorology, Instrumentation, Research and development, Silver iodide, Orog-

raphy, Mountains, Snowfall, Precipitation(Atmospheric).

Winter cloud seeding experiments were conducted in the Bridger Range of southwestern Montana during 1969-72 to determine the meteorological conditions under which ground-based silver iodide seeding could modify mountain snowfall in the climate of the Northern Rockies. The main portion of the research program was a randomized winter orographic cloud seeding experiment. Significant snowfall increases were obtained in at least 83 days of the 259 experimental days logged. Experiments aimed at developing a practical scheme for direct detection of cloud seeding effects are described. Several snowfall characteristics including ice crystal types, concentrations, and sizes were examined before, during, and after seeding events. Radar was used in several special experiments to directly detect seeding effects, detailed analysis of the spatial and temporal variability or orographic storms, and measurements of precipitation tops. Airflow and diffusion studies were made to verify targeting of the seeding agent. Both pilot ballon measurements and airborne plume tracing indicated generally successful targeting. (Knapp-USGS)
W74-11229

EVAPORATION OF WATER FROM SAND, 3: THE LOSS OF WATER INTO THE ATMOSPHERE FROM A SANDY RIVER BED UNDER ARID CLIMATIC CONDITIONS,
National Inst. for Water Research, Windhoek (South West Africa).
For primary bibliographic entry see Field 2D.
W74-11266

EVAPORATION OF WATER FROM SAND, 4: THE INFLUENCE OF THE DEPTH OF THE WATER-TABLE AND THE PARTICLE SIZE DISTRIBUTION OF THE SAND,
National Inst. of Water Research, Windhoek (South West Africa).
For primary bibliographic entry see Field 2D.
W74-11267

SEVENTH ANNUAL SURVEY REPORT ON THE AIR WEATHER SERVICE WEATHER MODIFICATION PROGRAM (FY 1974),
Air Weather Service, Washington, D.C.
H. A. Chary, R. L. Lininger, and J. E. Neyman.
Available from NTIS, Springfield, Va., 22161 as AWS-TR-74-254, Price $3.00 printed copy; $2.25 microfiche. Air Weather Service Technical Report 74-254, July 1974. 13 p, 3 fig, 1 tab.

Descriptors: *Weather modification, *Fog, *Military aspects, Cloud seeding.
Identifiers: *Fog dissipation.

This report is the seventh in a series of annual surveys of the Air Weather Service weather modification program. It briefly describes weather modification efforts undertaken during FY 1974, including the techniques, equipment, and results. During FY 74 AWS did not carry out any new field projects of operational testing and evaluation. The three cold-fog dissipation installations operated by AWS personnel were all used in a fully operational manner. (Knapp-USGS)
W74-11433

3C. Use Of Water Of Impaired Quality

NOTE ON LITHIUM IN SALINE GROUNDWATERS,
Central Soil Salinity Research Inst., Karnal (India).
For primary bibliographic entry see Field 5B.
W74-10908

TUCSON TACKLES TWO PROBLEMS.
For primary bibliographic entry see Field 5D.
W74-10945

MUSKEGON COUNTY WASTEWATER MANAGEMENT SYSTEM NO I,
Teledyne Triple R, Muskegon, Mich.
For primary bibliographic entry see Field 5D.
W74-10976

FLOAT WASH CLARIFIES WHITE WATER FOR PAPER MACHINE RE-USE,
For primary bibliographic entry see Field 5D.
W74-11091

GROWTH, MINERAL COMPOSITION, AND SEED OIL OF SESAME (SESAMUM INDICUM L.) AS AFFECTED BY BORON AND EXCHANGEABLE SODIUM,
California Univ., Riverside. Dept. of Soil Science and Agricultural Engineering.
Y. H. Yousif, F. T. Bingham, and D. M. Yermanos.
Soil Science Society of America Proceedings, Vol 36, No 6, p 923-926, November-December, 1972. 2 fig, 3 tab, 17 ref.

Descriptors: *Salinity, *Alkali soils, *Sodium, *Boron, Chemical properties, Soil chemistry, Saline soils, Salts.
Identifiers: *Sesame.

A solution culture boron experiment was conducted with sesame to show the effects of excessive B. The boron content of leaf blades, petioles, and stems was highly correlated with substrate boron. The leaf blades contained the highest amount of boron, and the stems and least. Concentrations of 5 mg B/l or higher inhibited growth, seed production, and resulted in a leaf necrosis and premature leaf drop. Foliage of plants receiving excess B contained > 700 micrograms B/g on a dry weight basis. An exchangeable sodium experiment using clay soil with and without a synthetic soil conditioner showed that yields were sharply reduced at an ESP level of 15 or greater. Leaf blade sodium was higher for the treatments without the soil conditioner but in both series, 50% growth depression was associated with leaf values of about 0.4% Na. Potassium and Mg in the leaf blades did not vary significantly, and although calcium was decreased 50% with increasing ESP, no visual deficiency symptoms were detected. (Skogerboe-Colorado State)
W74-11278

SOME EFFECTS OF METALS DISCHARGED IN EFFLUENTS AND POSSIBILITIES FOR THEIR RECOVERY,
Water Pollution Research Lab., Stevenage (England).
For primary bibliographic entry see Field 5D.
W74-11366

3D. Conservation In Domestic and Municipal Use

THE DETERMINATION OF ZONES OF INTENSE CONTRIBUTION TO STREAM FLOW AS RELATED TO THE CONCEPT OF PARTIAL AREA CONTRIBUTIONS,
Maryland Univ., College Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2A.
W74-10904

ARTIFICIAL AQUIFER STOPS STORM POLLUTION.
For primary bibliographic entry see Field 5D.
W74-10929

PROBLEMS ON POLLUTION AND WATER RESOURCES IN THE NEW YORK CITY METROPOLITAN AREA,
New York City Dept. of Water Resources.
For primary bibliographic entry see Field 5D.
W74-10942

3E. Conservation In Industry

THE INTEGRATION OF SYSTEM IDENTIFICATION AND SYSTEM OPTIMIZATION,
California Univ., Los Angeles.
For primary bibliographic entry see Field 6A.
W74-11042

FLOAT WASH CLARIFIES WHITE WATER FOR PAPER MACHINE RE-USE,
For primary bibliographic entry see Field 5D.
W74-11091

OPERATOR CERTIFICATION PROGRAMS APPLICABLE TO INDUSTRIALLY OWNED WASTE WATER FACILITIES,
National Council of the Paper Industry for Air and Stream Improvement, Inc., New York.
For primary bibliographic entry see Field 5D.
W74-11100

SOME CURRENT PAPER INDUSTRY ENVIRONMENTAL PROTECTION PROBLEMS,
National Council of the Paper Industry for Air and Steam Improvement, Inc., New York.
For primary bibliographic entry see Field 5D.
W74-11126

POLLUTION ABATEMENT IN A COPPER WIRE MILL.
For primary bibliographic entry see Field 5D.
W74-11383

3F. Conservation In Agriculture

EXPERIMENTAL HYDROPONIC GARDENING WITH MUNICIPAL WASTE WATER,
Florida Inst. of Tech., Melbourne. Dept. of Oceanography.
For primary bibliographic entry see Field 5D.
W74-10917

COMPARISON OF THE EFFICIENCIES OF VERTICAL AND HORIZONTAL DRAINAGE (SRAVNITEL'NAYA EFFEKTIVNOST' VERTIKAL'NOGO I GORIZONTALNOGO DRENAZHA),
N. M. Resetkina, and V. A. Dukhovnyy.
Gidrotekhnika i Melioratsiya, No 1, p 76-80, 1974. 1 fig, 1 tab.

Descriptors: *Groundwater, *Aquifers, *Hydrologic aspects, *Drainage, *Controlled drainage, Drainage practices, Subsurface drainage, Drainage engineering, Automation.
Identifiers: *USSR(Kirov area).

The efficiencies of vertical and horizontal drain and irrigation systems are compared on the basis of experiences gained with such systems in the Kirov and other areas. Vertical drain systems have advantages over horizontal systems in that they do not occupy useful farm lands, do not interfere with farming operations, they can be used year round, permit groundwater stabilization at any level, and permit the use of groundwater for irrigation. In addition, the construction of such vertical systems can be mechanized, and the operation be automated or remote-controlled. (Takacs-FIRL)
W74-10939

EFFECT OF CHANGES IN WATER BALANCE OF CULTIVATED FIELDS ON EROSION PROCESSES (VLIYANIYE IZMENENIYA VODNOGO BALANSA SEL'SKOKHOZYAYSTVENNYKH POLEY NA PROTSESSY EROZII),
Akademiya Nauk SSSR, Moscow. Institut Geografii.
For primary bibliographic entry see Field 2J.
W74-11011

SOME FEATURES OF WATER INFILTRATION INTO SOIL DURING SPRINKLER IRRIGATION (NEKOTORYYE OSOBENNOSTI VPITYVANIYA VLAGI V POCHVU PRI DOZHDEVANII),
For primary bibliographic entry see Field 2G.
W74-11013

ZINC TOXICITY IN HYDROPONIC CULTURE,
Guelph Univ. (Ontario). Dept. of Genetic Botany.
For primary bibliographic entry see Field 5C.
W74-11045

THE EFFECTS OF NITROGEN, POTASSIUM, AND SUBIRRIGATION ON THE YIELD, QUALITY, AND COMPOSITION OF SINGLE-TRUSS TOMATOES,
Agricultural Research Council, Littlehampton (England). Glasshouse Crops Research Inst.
P. Adams, G. W. Winsor, and J. D. Donald.
J Hortic Sci. Vol 48, No 1, p 123-133, 1973. Illus.
Identifiers: Acidity, Flowering fruits, Growth, *Nitrogen, *Potassium, *Tomatoes, Truss, Irrigation, *Crop yield.

Two successive crops of cv-'Minicraigella' were grown with subirrigation in a tiered-trough system, the troughs containing a 7:3:2 mixture of loam, peat and grit. Four concentrations of N in solution (100, 150, 200 and 250ppm N) were tested in factorial combination with three concentrations of K (200,300 and 400ppm K), the treatments being replicated four times. Plant height and leaf length increased markedly with N concentration, as also did the numbers of flowers and marketable fruits per plant, the mean weight per fruit and the total yield. Low N levels delayed harvesting. The proportion of unevenly ripened fruit decreased with increasing concentrations of both N and K. The percentage of hollow fruits was decreased by high K but increased with N concentration. The titratable acidity of the expressed fruit juices increased significantly with N concentration ($P < 0.001$) but was little affected by K treatment. The N concentration of the nutrient solution also largely controlled the percentage of K in the leaves and the total uptake of this nutrient. These unexpected results were attributed to stimulation of growth by N, leading to increased water requirements and hence to increased application of both N and K by the automatic subirrigation system. The highest yields and best quality fruit were obtained with 250ppm N and 400ppm K in the solution, although lower concentrations of K might be preferable after continued cropping in the same compost.--Copyright 1973, Biological Abstracts, Inc.
W74-11048

AN ALTERNATIVE EXPLANATION FOR THE APPARENTLY ACTIVE WATER EXUDATION IN EXCISED ROOTS,
Toronto Univ. (Ontario). Dept. of Botany.
M. T. Tyree.
J Exp Bot, Vol 24, No 78, p 33-37. 1973. Illus.
Identifiers: *Exudation, Maize, *Roots(Excised roots), Zea-Mays, *Corn(Field), Model studies, Osmotic pressure, Anions, Cations.

A standing-gradient osmotic-flow model has been proposed by others to explain the apparently active uptake in excised maize (Zea mays) roots. An alternative model is proposed which incorporates electrogenic coupling between the fluxes of anions and cations and electro-osmotic coupling between the fluxes of cations and water in the cell walls of roots. This model does not exclude the contribution (positive or negative) of a standing-gradient osmotic flow.--Copyright 1973, Biological Abstracts, Inc.
W74-11072

RATES OF GROWTH AND NUTRIENT UPTAKE OF IRRIGATED CORN AS AFFECTED BY N AND P FERTILIZATION,
Inst. of Agricultural Research, Volcani Bet. Dagan (Israel). Div. of Soil Chemistry and Plant Nutrition.
B. Bar-Yosef, and U. Kafkafi.
Soil Science Society of America Proceedings, Vol 36, No 6, p 931-936, November-December, 1972. 1 fig, 7 tab, 23 ref.

Descriptors: *Nutrient requirements, *Corn(Field), *Phosphorus, *Nitrogen, Fertilizers, Soil chemistry, Absorption.

Growth rates of corn and weekly uptake of major nutrients were measured in a permanent plot fertilization experiment. Bicarbonate-soluble P and NO3-N concentration in the soil were measured four times during the growing period. High levels of nitrates in the soil during the first month of growth suppressed dry matter production. An increase in soil phosphate concentration resulted in higher phosphate uptake and early appearance of male flowers. On the control plots, which had not received any phosphatic fertilizer for eight years, the plants took up more phosphate than the amount estimated by the bicarbonate method. The high levels of nitrates found in the soil 4 weeks after seeding dropped within the fifth week to a level of 20-10 ppm N. Denitrification to gaseous compounds in the presence of living plants due to 68 mm of sprinkler-applied water is proposed as an explantion of this phenomenon. (Skogerboe-Colorado State)
W74-11263

CROP RESIDUE, SOIL WATER, AND SOIL FERTILITY RELATED TO SPRING WHEAT PRODUCTION AND QUALITY AFTER FALLOW,
Agricultural Research Service, Sidney, Mont.
A. L. Black.
Soil Science Society of America Proceedings, Vol 37, No 5, p 754-758, September-October, 1973. 1 fig, 5 tab, 19 ref.

Descriptors: *Cultivation, *Fallowing, Organic matter, Mulching, *Fertilizers, Nitrogen, Phosphorous, Proteins, *Wheat, *Soilwater.

Over an eight year period, wheat straw mulch rates to 0, 1,680, 3,360, and 6,730 kg/ha were established each spring of the fallow year in alternate crop-fallow blocks in three replications on a Dooley sandy loam. Fertilizer subplot treatments applied before seeding spring wheat were as follows: Check, N/P, and N plus P. Both elements were applied at a rate of 34kg/ha; N was applied each crop year, and P was applied initially and every other crop year thereafter. After 14 and 21 months of fallow, average available soil water stored to a depth of 1.5 m increased significantly and was positively correlated with increasing residue levels. Each metric ton of surface residue increased average available soil water supplies 0.5 cm. Mean grain yields were positively correlated with stored soil water at seeding only when both N and P were applied. N-P fertilization increased mean grain yields 410, 580, 690, and 760 kg/ha per year for corresponding residue levels of 0, 1,680, 3,360, and 6,730 kg/ha respectively. (Skogerboe-Colorado State)
W74-11264

CALCIUM, MAGNESIUM, AND POTASSIUM SATURATION RATIOS IN TWO SOILS AND THEIR EFFECTS UPON YIELDS AND NUTRIENT CONTENTS OF GERMAN MILLET AND ALFALFA,
Ohio State Univ., Columbus.
E. O. McLean, and M. D. Carbonell.
Soil Science Society of America Proceedings, Vol 36, No 6, p 927-930, November-December, 1972. 3 tab, 16 ref.

Descriptors: *Salinity, Saline soils, Nutrients, *Calcium, *Magnesium, *Potassium, *Alfalfa, *Crop response.
Identifiers: *German millet.

A greenhouse study involving sequential cropping of two soils of differing cation exchange capacities with five Ca-Mg saturation ratios at two K levels was conducted. German millet followed by alfalfa was grown with Mg-Ca saturations varied from Mg 5%-Ca 75% to Mg 25%-Ca 55% at two K levels. German millet yields were not affected in the above range of Ca-Mg saturations. However, an apparent Mg response occurred when alfalfa yields were more than double by increasing initial Mg and Ca saturations from 3 and 18% to 5 and 75%, respectively. Exchangeable Mg and Ca contents in the soils after cropping plus amounts removed by cropping were less than the initial contents in one soil and were more than the initial contents in the other. Evidently some type of fixation mechanism tied up Mg and Ca in the former whereas solubilization of residual lime released them in the latter. (Skogerboe-Colorado State)
W74-11269

APPLIED AND RESIDUAL NITRATE-NITROGEN EFFECTS ON IRRIGATED GRAIN SORGHUM YIELD,
Texas A and M Univ., Lubbock. Agricultural Research and Extension Center.
A. B. Orken, and H. D. Sunderman.
Soil Science Society of America Proceedings, Vol 36, No 1, p 94-97, January-February, 1972. 4 tab, 14 ref.

Descriptors: *Nutrient removal, *Nitrogen, *Crop response, Crop production, Crops, Leaching, Water pollution sources, *Sorghum.

Multirate nitrogen studies were conducted for a three year period, on an irrigated clay loam soil at two locations, to determine the influence of applied and residual soil N on the yield of grain sorghum. Soil samples were taken prior to fertilizer application in depth increments of 0-15, 15-30, 30-61, and 61-91 cm and analyzed for nitrate. Applied and residual soil NO3-N were found to influence grain yields. Regression analysis of the data showed highly significant relationships between quantities of soil nitrates measured at upper depths to those measured at lower depths, and grain yield and applied N+ residual NO3-N. Best correlations were obtained when residual NO3-N was included in the regression equation. Results indicated that soil samples taken to 15 or 30 cm would be sufficient for evaluation of residual nitrogen effects. (Skogerboe-Colorado State)
W74-11270

A LONG-TIME WATER-TABLE STUDY OF AN IRRIGATION PROJECT IN SOUTHERN ALBERTA,
Department of Agriculture, Lethbridge, (Alberta). Research Station.
E. Rapp, and van Schaik.
Canadian Agricultural Engineering, Vol 14, No 1, p 29-32, June, 1972. 3 fig, 2 tab, 5 ref.

Descriptors: *Drainage, *Groundwater, *Water table, Drainage, Drainage engineering, Irrigation, Groundwater movement, Soil water, *Canada.

Water table levels were measured for a period of 15 years in the Vauxhall District. The seasonal mean water table depth was 169 cm with a stan-

dard deviation of plus or minus 10 cm. On the average, 64% of the area had a water table higher than the accepted standard of 183 cm. Although variability in some Units was high, mean seasonal water table data indicate that no serious drainage problem exists in the Vauxhall District. There was no consistent relationship between irrigation water used or the total hydrologic input and the concurrent water table depth. This indicates that the water table in the Vauxhall District is not a direct function of either irrigation or seasonal rainfall on a long-term basis. (Skogerboe-Colorado State)
W74-11271

MULCH AND TILLAGE RELATIONSHIPS IN CORN CULTURE,
Ohio Agricultural Research and Development Center, Wooster.
D. M. Van Doren, Jr., and G. B. Triplett, Jr.
Soil Science Society of America Proceedings, Vol 37, No 5, p 766-769, September-October, 1973. 4 tab, 10 ref.

Descriptors: *Cultivation, *Mulching, *Organic matter, *Corn(Field).

Relative effects of soil mulch cover and various tillage practices on corn yield were studied as functions of previous crop and rainfall on a typic fragiudalf soil. Residues were removed from the soil prior to tillage, manipulated according to action of the tillage implements, or replaced on the soil surface after tillage. Eight tillage treatments consisted of all possible combinations of moldboard plowing, disking, and post emergence cultivation. Mulch cover produced three times as great a yield effect as any other single variable. Tillage variables increased yield in order of cultivation > plow > disk, and results are expressed in terms of mulch cover required to produce an equal yield effect. Most tillage and mulch effects were additive. The major reason for mulch and tillage effects on corn yield is assumed to be their influence on soil water content. Possible extrapolation of these results to other soils and climates is discussed. (Skogerboe-Colorado State)
W74-11275

RESIDUAL EFFECTS OF N15-LABELED FERTILIZERS IN A FIELD STUDY,
Illinois Univ., Urbana. Dept. of Agronomy.
R. L. Westerman, and L. T. Kurtz.
Soil Science Society of America Proceedings, Vol 36, No 1, p 91-94, January-February, 1972. 1 fig, 3 tab, 6 ref.

Descriptors: *Nutrient removal, *Nitrogen, *Leaching, Crop production, Crop response, Crops, Denitrification, *Radioisotopes, Sorghum, *Sudangrass, Water pollution sources.

Residual effects of two N15-labeled N fertilizers, urea and oxamide, were compared during the second cropping season after they had been applied at rates of 0, 56, 112, and 168 kg N/ha. 'Sudax SX11' sorghum-sudan grass hybrid was grown and harvested three times during this second cropping season while the residual effects were being measured. Fertilizer N removed in plant tops during this second year of cropping contained 13-18% of the residual fertilizer N in the soil at the end of the first season and was equal to 4-6% of that applied originally in the fertilizers. At the end of the second cropping season, 22 and 26% of the initial applications of N in urea and oxamide, respectively, remained in the soil. The effect of carriers on these amounts of residual fertilizer N was not significant. The removals in crops during the second season were essentially equal to the residual fertilizer N which had been in the soil at the end of the first season. (Skogerboe-Colorado State)
W74-11276

A WEIGHING SYSTEM FOR LYSIMETERS,
Department of Agriculture, Ottawa (Ontario). Engineering Research Service.
For primary bibliographic entry see Field 2D.
W74-11277

PRIMING EFFECT OF N-15 LABELED FERTILIZERS ON SOIL NITROGEN IN FIELD EXPERIMENTS,
Arizona Univ., Tucson. Dept. of Soils.
For primary bibliographic entry see Field 5B.
W74-11279

ASPECTS OF AGRICULTURAL USE OF POTATO STARCH WASTEWATER,
Agricultural Univ., Wageningen (Netherlands). Dept. of Soils and Fertilizers.
F. A. M. De Haan, G. J. Hoogeveen, and F. Riem Vis.
Neth J Agric Sci. Vol 21, No 1, p 85-94. 1973. Illus.

Descriptors: *Water reuse, *Waste water disposal, Fertilizers.
Identifiers: Land disposal, Potato starches.

Agricultural industries in the NE Netherlands, with the potato starch industry as the most important one, produce a very large amount of wastewater. Research work is now performed on possible solutions to the environmental problems resulting from discharge of this water on open canals. Land-disposal offers such a possibility. The wastewater contains the natural components of potatoes. The main constituents are the major elements for plant nutrition thus rendering an opportunity to recycle these components. Evaluation of wastewater use for agricultural purposes must be based on a number of criteria of which the most important ones are: purification by the soil system, fertilization of agricultural crops, and economic effects. Experimental results and model calculations indicate that with mean yearly application rates in the range of 50-100 mm the relevant requirements are practical.--Copyright 1974, Biological Abstracts, Inc.
W74-11356

ERODIBILITY OF SOILS UNDER STORM RUNOFF CONDITIONS (ERODIRUYEMOST' POCHV V USLOVIYAKH LIVNEVOGO STOKA),
Akademiya Nauk Moldarskoi SSR, Kishinev. Otdel Geografii.
For primary bibliographic entry see Field 2J.
W74-11449

4. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control Of Water On The Surface

RATIONAL INSTITUTIONAL ARRANGEMENTS FOR WATER RESOURCES MANAGEMENT,
Iowa Univ., Iowa City.
For primary bibliographic entry see Field 6E.
W74-10901

STORM DRAINAGE SYSTEMS DESIGN MADE ADAPTABLE FOR COMPUTERS,
Austin Co., Roselle, N.J. Civil - Structural Dept.
M. Dillon.
Building System Design, Vol 70, No 7, p 27-29, October/November, 1973.

Descriptors: *Model studies, Storm runoff, *Drainage systems, *Storm drains, Rainfall intensity.
Identifiers: *Rational method of storm design.

The Rational Method of Storm Design is described and applied to a computerized design of storm drainage systems for 2 to 200 acre commercial and industrial sites. The Rational Method presents a formula for the peak discharge rate in cubic feet per second in terms of the drained area in acres, runoff coefficient, and the average rainfall intensity in inches per hour. It is necessary to know the time of concentration for proper design of a storm drainage system. The time of concentration is the sum of overland flow time, plus time of flow in pipe above the design section. Overland flow time is the longest period of time, measured from the beginning of a theoretical design storm, for runoff to travel from the most remote point of the collection area, along a path perpendicular to contour lines, down to the design section, usually an inlet. (Merritt-FIRL)
W74-10916

COMPARISON OF THE EFFICIENCIES OF VERTICAL AND HORIZONTAL DRAINAGE (SRAVNITEL'NAYA EFFEKTIVNOST' VERTIKAL'NOGO I GORIZONTALNOGO DRENAZHA),
For primary bibliographic entry see Field 3F.
W74-10939

A SCHEME FOR ASSESSING THE RELIABILITY OF INTERPOLATED RAINFALL ESTIMATES,
Birmingham Univ. (England). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2B.
W74-10941

HYDRAULIC PERFORMANCE OF PENNSYLVANIA HIGHWAY DRAINAGE INLETS INSTALLED IN PAVED CHANNELS,
Lehigh Univ., Bethlehem, Pa. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8A.
W74-11009

APPLICATION HYDROLOGIC AND HYDRAULIC RESEARCH TO CULVERT SELECTION IN MONTANA--VOL II, APPENDICES,
Montana State Univ., Bozeman. Dept. of Civil Engineering and Engineering Mechanics.
For primary bibliographic entry see Field 8B.
W74-11022

WATER LEVELS IN ARTESIAN AND NONARTESIAN AQUIFERS OF FLORIDA, 1971-72,
Geological Survey, Tallahassee, Fla.
H. G. Healy.
Florida Bureau of Geology, Tallahassee, Information Circular No 85, 1974. 94 p, 54 fig, 1 tab.

Descriptors: *Water levels, *Groundwater, *Florida, Aquifers, Withdrawal, Saline water intrusion, Data collections, Basic data collections, Hydrologic data, Water level fluctuations, Hydrogeology.

The trends and fluctuations of groundwater levels in wells tapping the principal aquifers in Florida during 1971-72 are summarized by hydrographs of wells in the several aquifers, maps showing changes in groundwater levels during specific periods, and a table summarizing the principal data in selected observation wells. The demand for freshwater for industrial, municipal, and agricultural uses in Florida has increased yearly. Although groundwater supplies have been adequate for the increased demand in most areas, water levels have declined appreciably in some. Because demand for groundwater continues to increase, shortages will occur and may become critical in some areas. In coastal areas, declining water levels may allow saltwater to enroach and shortages could result from deterioration in quality as well as from the reduction of quantity of water available. (Knapp-USGS)

W74-11025

THE RANDOM MODEL IN FLUVIAL GEOMORPHOLOGY,
Thomas J. Watson Research Center, Yorktown Heights, N.Y.
For primary bibliographic entry see Field 8B.
W74-11035

W.A.L.R.U.S. WATER AND LAND RESOURCE UTILIZATION SIMULATION PLAYER'S MANUAL (WISCONSIN VERSION),
Wisconsin Univ., Madison.
For primary bibliographic entry see Field 6A.
W74-11041

ROUGHNESS COEFFICIENTS OF VEGETATED FLOOD PLAINS,
Ministry of Transport and Waterways, the Hague (Netherlands). Maas-River Study Div.
For primary bibliographic entry see Field 2E.
W74-11136

MOORHEAD BAYOU WATERSHED, SUNFLOWER COUNTY, MISSISSIPPI (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Jackson, Miss.
For primary bibliographic entry see Field 6E.
W74-11143

TOMBIGBEE RIVER (EAST FORK), ITAWAMBA COUNTY, MISSISSIPPI. OPERATION AND MAINTENANCE.
Army Engineer District, Mobile, Ala.
Available from Nat. Tech. Info. Serv., as EIS-MS-73-1749-F. November 5, 1973. 73 p, 1 map.

Descriptors: *Mississippi, *Channel improvement, *Flood protection, Flood control, Gulf Coast plain.
Identifiers: *Itawamba Co, Miss, *Environmental Impact Statements.

This project is part of the continuing operation of the existing flood control program on the Tombigbee River in Itawamba County, Mississippi. The maintenance work consists of removal of snags and drift jams that obstruct the flow of the river and disposal of the debris. At present the channel is choked by drift jams and obstructions throughout its length, causing flooding which would not occur if the channel was cleared. The project will alleviate the flood conditions and improve the navigability of the river. The adverse environmental effects would be primarily the increased turbidity accompanying construction activity and the reduction of available habitat for aquatic invertebrates and algae. Bank clearing, channelization, and no action were deemed nonfeasible alternatives for this project. Both short-term and long-term productivity will be enhanced with minimal detrimental effect upon wildlife and aquatic habitat. Comments received from various state and federal agencies support this project. (Deckert-Florida)
W74-11144

WATERS AND WATERCOURSES---LIABILITY FOR DIKING FLOODWATERS: REJECTION OF THE 'COMMON ENEMY' DOCTRINE.
For primary bibliographic entry see Field 6E.
W74-11149

HYGIENIC EVALUATION OF SURFACE WATERS IN THE TRANSCARPATHIAN REGION, (IN RUSSIAN),
For primary bibliographic entry see Field 5B.
W74-11171

THE HYDROLOGY OF THE LEXINGTON AND FAYETTE COUNTY, KENTUCKY AREA,
Geological Survey, Louisville, Ky.
D. S. Mull.
Lexington and Fayette County Planning Commission, Lexington, 1968. 24 p, 23 fig, 3 tab, 27 ref.

Descriptors: Water resources, *Surface waters, *Groundwater, *Kentucky, Data collections, Hydrologic data, Hydrogeology, Karst hydrology, Surface-groundwater relationships, Base flow.
Identifiers: *Lexington(KY), *Fayette County(KY).

The water resources in rivers, creeks and ponds and circulating groundwaters in Fayette County, Kentucky, are described. About 582 mgd of water, or 43.71 inches annually, enters Fayette County from precipitation. About 60 percent, or 340 mgd, of this is consumed by crops, natural vegetation, evaporation, and man. The remainder, approximately 240 mgd, is potentially available for use. Most of this water, 224 mgd, runs off in streams to the Kentucky River. A small amount of water, 16 mgd, is lost from the county by underflow. During times of flood, water levels in the streams rise above the water table and recharge the groundwater reservoir in the vicinity of the stream. Fairly high volumes of water may be discharged to the groundwater reservoir in the Lexington area due to the abundance of joints and solution openings that are common in the underlying beds of limestone. All streams in the area flow directly on bedrock or on a layer of alluvium. Streamflow is variable and results from a combination of surface runoff and seepage from groundwater in aquifers underlying the streambed. An additional source of streamflow in the urbanized area is sewage effluent. During dry weather, seepage from groundwater is the major source of streamflow in all streams in the Lexington area except Town Branch. In Town Branch the major source of dry-weather flow is effluent from the Lexington sewage treatment plant. (Knapp-USGS)
W74-11201

MOISTURE REGIME OF MEADOW SOILS ON THE OKA RIVER FLOOD PLAIN (REZHIM VLAZHNOSTI POYMENNYKH POCHV OKSKIKH LUGOV),
Dedinovskaya Opytnaya Stantsiya po Poimennomu Lugovodstvu (USSR).
For primary bibliographic entry see Field 2G.
W74-11204

WATER-SUPPLY DEVELOPMENT AND MANAGEMENT ALTERNATIVES FOR CLINTON, EATON, AND INGHAM COUNTIES, MICHIGAN,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 4B.
W74-11223

HYDROLOGIC ENGINEERING METHODS FOR WATER RESOURCES DEVELOPMENT: VOLUME I, REQUIREMENTS AND GENERAL PROCEDURES,
Hydrologic Engineering Center, Davis, Calif.
For primary bibliographic entry see Field 8B.
W74-11231

GENERALIZED SKEW COEFFICIENTS OF ANNUAL FLOODS IN THE UNITED STATES AND THEIR APPLICATION,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 2E.
W74-11420

FLOOD PLAIN INFORMATION, HOADLEY CREEK, KETCHIKAN, ALASKA.
Corps of Engineers, Anchorage, Alaska.
Flood Plain Report, June 1974. 23 p, 7 fig, 7 plate, 2 tab.

Descriptors: *Floods, *Alaska, Flood control, *Flood plain zoning, Flood protection, Flood data.
Identifiers: *Hoadley Creek(AK), *Ketchikan(AK).

Flooding from Hoadley Creek, Ketchikan, AK, is described. The properties along this stream are primarily residential and, for the most part, have been developed only in recent years. There are still open spaces adjacent to the stream which are available for future development. A knowledge of flood potential and flood hazards is important in land use planning and for management decisions concerning flood plain use. The study includes a history of flooding along Hoadley Creek and identifies those areas that are subject to possible future floods. Special emphasis is given to these floods through maps, photographs, profiles and cross sections. A basis is provided for the adoption of land use controls to guide flood plain development and thereby prevent intensification of loss and damage. (Knapp-USGS)
W74-11427

FLOOD PLAIN INFORMATION, WHIPPLE CREEK, KETCHIKAN, ALASKA.
Corps of Engineers, Anchorage, Alaska.
Flood Plain Report, June 1974. 23 p, 7 fig, 9 plate, 2 tab.

Descriptors: *Floods, *Alaska, Flood control, *Flood plain zoning, Flood protection, Flood data.
Identifiers: *Whipple Creek(AK), *Ketchikan(AK).

Flooding from Whipple Creek, Ketchikan, AK, is described. The properties along this stream are primarily residential and have not been damaged by past floods. Although large floods have occurred in the past, studies indicate that even larger floods are possible. The open spaces along the stream which are available for future development are extensive. A knowledge of flood potential and flood hazards is important in land use planning and for management decisions concerning flood plain use. Special emphasis is given to these floods through maps, photographs, profiles and cross sections. A suitable basis is provided for the adoption of land use controls to guide flood plain development and thereby prevent intensification of loss and damage. (Knapp-USGS)
W74-11428

FLOOD PLAIN INFORMATION, CARLANNA CREEK, KETCHIKAN, ALASKA.
Corps of Engineers, Anchorage, Alaska.
Flood Plain Report, June 1974. 27 p, 8 fig, 6 plate, 2 tab.

Descriptors: *Floods, *Alaska, Flood control, *Flood plain zoning, Flood protection, Flood data.
Identifiers: *Carlanna Creek(AK), *Ketchikan(AK).

Flooding from Carlanna Creek, Ketchikan, AK, is described. The properties along this stream are primarily residential and industrial and were severely damaged by the October 1973 flood. The open spaces adjacent to the stream in the study area are limited and are not presently under pressure for development. Large floods have occurred in the past and will occur in the future. A knowledge of flood potential and flood hazards is important in land use planning and for management decisions concerning flood plain use. Special emphasis is given to these floods through maps, photographs, profiles and cross sections. A suitable basis is provided for the adoption of land use controls to guide flood plain development and thereby prevent intensification of loss and damage. (Knapp-USGS)
W74-11429

FLOOD PLAIN INFORMATION, KETCHIKAN CREEK, KETCHIKAN, ALASKA.
Corps of Engineers, Anchorage, Alaska.

Army Corps of Engineers Flood Plain Report, June 1974. 31 p, 13 fig, 9 plate, 2 tab.

Descriptors: *Floods, *Alaska, Flood control, *Flood plain zoning, Flood protection, Flood data.
Identifiers: *Ketchikan Creek(AK).

Flooding from Ketchikan Creek, Ketchikan, AK, is described. The properties along this stream are primarily residential and have been moderately damaged by past floods. The open spaces in the flood plain are limited and are not now under pressure for future development. A knowledge of flood potential and flood hazards is important in land use planning and for management decisions concerning flood plain use. Special emphasis is given to floods through maps, photographs, profiles and cross sections. A suitable basis is provided for the adoption of land use controls to guide flood plain development and thereby prevent intensification of loss and damage. (Knapp-USGS)
W74-11430

4B. Groundwater Management

NOTE ON LITHIUM IN SALINE GROUNDWATERS,
Central Soil Salinity Research Inst., Karnal (India).
For primary bibliographic entry see Field 5B.
W74-10908

METHOD OF TREATING SUBTERRANEAN FORMATION TO IMPROVE PERMEABILITY,
Texaco, Inc., New York.
For primary bibliographic entry see Field 8B.
W74-10931

HYDROGEOLOGY OF THE USSR. VOLUME 15: BASHKIR ASSR (GIDROGEOLOGIYA SSSR. TOM XV. BASHKIRSKAYA ASSR).
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrogeologii i Inzhenernoy Geologii, Moscow (USSR).
For primary bibliographic entry see Field 2F.
W74-11017

HYDROGEOLOGY OF THE USSR. VOLUME 29: KAMCHATKA, AND THE KURIL AND KOMANDORSKIYE ISLANDS (GIDROGEOLOGIYA SSSR. TOM XXIX. KAMCHATKA, KURIL'SKIYE I KOMANDORSKIYE OSTROVA).
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrogeologii i Inzhenernoy Geologii, Moscow (USSR).
For primary bibliographic entry see Field 2F.
W74-11018

HYDROGEOLOGY OF THE USSR. VOLUME 38: TURKMEN SSR (GIDROGEOLOGIYA SSSR. TOM XXXVIII. TURKMENSKAYA SSR).
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrogeologii i Inzhenernoy Geologii, Moscow (USSR).
For primary bibliographic entry see Field 2F.
W74-11019

HYDROGEOLOGY OF THE USSR. VOLUME 40: KIRGIZ SSR (GIDROGEOLOGIYA SSSR. TOM XL. KIRGIZSKAYA SSR).
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrogeologii i Inzhenernoy Geologii, Moscow (USSR).
For primary bibliographic entry see Field 2F.
W74-11020

AVAILABILITY OF GROUNDWATER IN THE LOWER PAWCATUCK RIVER BASIN, RHODE ISLAND,
Geological Survey, Washington, D.C.
J. B. Gonthier, H. E. Johnston, and G. T. Malmberg.
Available from Sup Doc, GPO, Washington, D.C. 20402 Price $3.80. Water-Supply Paper 2033, 1974. 40 p, 7 fig, 10 tab, 24 ref.

Descriptors: *Groundwater, *Groundwater availability, *Rhode Island, Groundwater recharge, Induced infiltration, Groundwater reservoirs, Water supply, Aquifers, Water quality, Withdrawal, Water yield, Surface-groundwater relationships, Water resources.
Identifiers: *Lower Pawcatuck River basin(RI).

The water availability in the lower Pawcatuck River basin in southwestern Rhode Island was determined. The basin is an area of about 169 sq mi underlain by crystalline bedrock over which lies a relatively thin mantle of glacial till and stratified drift. Water available for development in this aquifer consists of groundwater in storage plus infiltration that can be induced into streams. Minimum annual groundwater runoff is 0.76 mgd per square mile. Potential recharge by induced infiltration is estimated to range from about 250 to 600 gpd per linear foot of streambed for the principal streams. In most areas, induced infiltration from streams constitutes the major source of water potentially available for development by wells. The potential yield from five of the most promising groundwater reservoirs was evaluated by means of mathematical models. Continuous withdrawals ranging from 1.3 to 10.3 mgd, and totaling 31 mgd, are obtainable from these reservoirs. Proposed export from the Pawcatuck basin of 27 mgd will markedly reduce low streamflow. The 90% duration flow of the Pawcatuck River at Westerly would be reduced from 75 mgd to perhaps as little as 21 mgd. The chemical quality of water from both the sand and gravel aquifer and associated streams is suitable for most purposes. Some treatment may be required locally for removal of iron and manganese to meet recommended standards. (Myers-USGS)
W74-11023

GROUNDWATER BASIC DATA FOR ADAMS AND BOWMAN COUNTIES, NORTH DAKOTA,
Geological Survey, Bismarck, N. Dak.
For primary bibliographic entry see Field 2F.
W74-11024

THE INTEGRATION OF SYSTEM IDENTIFICATION AND SYSTEM OPTIMIZATION,
California Univ., Los Angeles.
For primary bibliographic entry see Field 6A.
W74-11042

THE HYDROLOGY OF THE LEXINGTON AND FAYETTE COUNTY, KENTUCKY AREA,
Geological Survey, Louisville, Ky.
For primary bibliographic entry see Field 4A.
W74-11201

HYDROGEOLOGY OF GLACIAL DRIFT, MESABI IRON RANGE, NORTHEASTERN MINNESOTA,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 2F.
W74-11222

WATER-SUPPLY DEVELOPMENT AND MANAGEMENT ALTERNATIVES FOR CLINTON, EATON, AND INGHAM COUNTIES, MICHIGAN,
Geological Survey, Washington, D.C.
K. E. Vanlier, W. W. Wood, and J. O. Brunett.
Available from GPO, Washington, D C 20402, Price $3.20 paper copy. Water-Supply Paper 1969, 1973. 111 p, 35 fig, 6 tab, 34 ref.

Descriptors: *Water resources development, *Water management(Applied), *Michigan, Surface waters, Groundwater, Conjunctive use, Great Lakes, Inter-basin transfers.
Identifiers: *Lansing(Mich), Clinton County(Mich), Eaton County(Mich), Ingham County(Mich).

The water resources of the Tri-County region, consisting of Clinton, Eaton, and Ingham Counties, an area of 1,697 square miles in Michigan's Lower Peninsula were investigated. The population is nearing 400,000 and by 1990 will be near 600,000. Average daily water use is slightly more than 30 million gallons today; by 1980 it will be about 50 million gallons, and by 1990 it will probably be about 70 million gallons. The Tri-County region is drained by seven river systems. Low flows in cubic feet per second, are as follows: Grand River, 180; Maple River, 34; Looking Glass River, 28; Red Cedar River, 30; Portage Creek, 15; Battle Creek, 20; and Thornapple River,24--a total of 331 cubic feet per second or about 220 million gallons per day. The principal source of groundwater is a complex aquifer system composed of the Saginaw and Grand River Formations and some of the overlying glacial sediments. This aquifer yields between 300 and 700 gpm to individual wells. In some parts of the region, the glacial sediments are favorable for development of moderate to large supplies of water. Some of the chief factors and methods that must be considered when planning water systems are combined use of ground and surface water, artificial recharge, treatment of wastes, use of storage reservoirs, and importation of water from the Great Lakes. (Knapp-USGS)
W74-11223

HYDROLOGIC ENGINEERING METHODS FOR WATER RESOURCES DEVELOPMENT: VOLUME 10. PRINCIPLES OF GROUNDWATER HYDROLOGY,
Hydrologic Engineering Center, Davis, Calif.
For primary bibliographic entry see Field 8B.
W74-11232

NONLINEAR TECHNOLOGICAL FUNCTIONS FOR AQUIFERS WHOSE TRANSMISSIVITIES VARY WITH DRAWDOWN,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 2F.
W74-11424

COST ANALYSIS OF GROUNDWATER SUPPLIES IN THE NORTH ATLANTIC REGION,
Geological Survey, Reston, Va.
D. J. Cederstrom.
Water Well Journal, Vol 28, No 8, p 39-43, August 1974. 3 tab.

Descriptors: *Water wells, *Water costs, *Northeast U.S., *Water yield, Economics, Water distribution(Applied), Water sources, Water supply, Hydrogeology, Groundwater, Cost analysis, Construction costs.

Methods are given for calculating costs of groundwater supplies for municipal and industrial uses from aquifers in the North Atlantic Region. The capital cost of groundwater and the cost per thousand gallons in typical geologic and hydrologic environments is given in tabular form. For broad planning purposes, large areas may be generally characterized as to range of yields per well. The materials and work needed to construct wells with those yields can be estimated within reasonable limits. The cost of large supplies of groundwater at the wellhead in the North Atlantic Region in 1970 generally varied from 1.5 to 5 cent/kgal. Water from crystalline rocks and shale is relatively expensive. Water from sandstone is less so. Costs of water from sands and gravels in glaciated areas and from Coastal Plain sediments range from moderate to very low. In carbonate rocks costs range from low to fairly high. Development of small to moderate supplies to groundwater may

offer favorable cost alternatives to planners, but large supplies of groundwater for delivery to one point cannot generally be developed inexpensively. Well fields in the less productive aquifers may be limited by costs to 1 or 2Mgal/d, but in the more favorable aquifers development of several tens of millions of gallons a day may be practicable and inexpensive. (Knapp-USGS)
W74-11426

DIGITAL MODELING OF RADIOACTIVE AND CHEMICAL WASTE TRANSPORT IN THE SNAKE RIVER PLAIN AQUIFER AT THE NATIONAL REACTOR TESTING STATION, IDAHO,
Geological Survey, Idaho Falls, Idaho.
For primary bibliographic entry see Field 5B.
W74-11439

GROUNDWATER DISCHARGE FROM THE EDWARDS AND ASSOCIATED LIMESTONES, SAN ANTONIO AREA, TEXAS, 1973,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 2F.
W74-11440

PROSPECTS OF GROUNDWATER USE IN THE NEMAN AND NERIS RIVER VALLEYS (PERSPEKTIVY ISPOL'ZOVANIYA PODZEMNYKH VOD RECHNYKH DOLIN NYAMUNAS I NERIS),
Litovskii Nauchno-Issledovatelskii Geologorazvedochnyi Institut, Vilnius (USSR).
J. Diliunas.
Litovskiy Nauchno-Issledovatel'skiy Geologorazvedochnyy Institut Trudy, No 22, Vilnius, Izdatel'stvo 'Mintis', 1973. 120 p.

Descriptors: *Groundwater, *Hydrogeology, *Valleys, *Rivers, *Water utilization, Withdrawal, Water supply, Water yield, Aquifers, Surface-groundwater relationships, Recharge, Water levels, Sediments, Sedimentology, Forecasting, Zoning, Cross-sections, Maps, Curves, Equations.
Identifiers: *USSR(Lithuania), *Neman River(USSR), *Neris River(USSR).

Problems of groundwater use in the Neman and Neris River valleys in Lithuania are discussed. Natural conditions and factors influencing groundwater storage, and hydrogeologic conditions in the river valleys are described. Procedures are given for groundwater-yield forecasting, and prospects of artificial recharge of groundwater are studied. (Josefson-USGS)
W74-11447

4C. Effects On Water Of Man'S Non-Water Activities

URBANIZATION AND THE ENVIRONMENT--ENGINEERING IMPLICATIONS,
Johannesburg City Engineer's Dept. (South Africa).
V. Bolitho.
The Civil Engineer in South Africa, Vol 16, No 2, p 44-49, February, 1974. 10 ref.

Descriptors: *Industries, *Cities, *Human population, *Environmental engineering, Environmental control, Pollution, *Urbanization.
Identifiers: *South Africa, Urban planning.

Two of the gravest challenges faced by the Republic of South Africa are the need to build cities and industries for approximately 20 million people by the end of the century and the solution of the environmental problems which this effort will involve. Pollution, seen as disturbing equilibrium, is a serious threat both within the city and to its surroundings. The engineer will be heavily involved in solutions to these problems, but to increase his effectiveness a re-examination of the engineer's role in urban planning and environmental control is necessary. (Prague-FIRL)
W74-11124

MAINTENANCE DREDGING, NEW HAVEN HARBOR, CONNECTICUT (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Corps of Engineers, Waltham, Mass. New England Div.
Available from National Technical Information Service, as EIS-CT-73-1357-F. August 16, 1973. 270 p, 27 fig, 13 tab.

Descriptors: *Dredging, *Harbors, *Connecticut, Spoil banks, Continental shelf, Atlantic Ocean, Coastal plains, Sediment control.
Identifiers: *Environmental Impact Statements, *Offshore dumping, *New Haven Harbor(CT).

This project involves maintenance dredging of the main channel in New Haven Harbor, Connecticut and disposal of 800,000 cubic yards of spoil material at the New Haven Dumping Grounds in Long Island Sound. The dredging is necessary for the continued operation of the harbor and would be done between October 1 and May 31 to minimize adverse effects upon the oyster beds present in the waters. Considerable opposition to the offshore spoil deposit has been raised by many environmental groups and government agencies. While the primary benefits of the project are economic, there is a possibility of significant detrimental effects upon aquatic life both from the dredging and the spoil deposit. The controversy centers around the uncertainty regarding the effects of the spoil on the aquatic life in the area of the dump. All alternative methods of disposal are considered prohibitively expensive. Though delay would create serious economic difficulties for the harbor area, the environmentalists urge that the project be postponed until more conclusive data can be obtained. The plan calls for continuous monitoring of the dump site for adverse effects, but this protection is considered inadequate by those who oppose the project. (Deckert-Florida)
W74-11140

4D. Watershed Protection

A FINITE ELEMENT APPROACH TO WATERSHED RUNOFF,
University Coll. of Swansea (Wales). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2A.
W74-10937

5. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification Of Pollutants

THE USE OF MAGNETIC IRON OXIDE FOR RECOVERY OF VIRUS FROM WATER,
New Hampshire Univ., Durham. Water Resource Research Center.
For primary bibliographic entry see Field 5D.
W74-10905

METHODS FOR THE DIRECT DETERMINATION OF HEAVY-METAL POLLUTANTS IN THE ENVIRONMENT,
Louisiana State Univ., Baton Rouge.
D. K. Wolcott.
Available from University Microfilms, 300 No. Zeeb Rd., Ann Arbor, Mich., 48106 (Order No. 74-7273). Ph D Dissertation, 1973. 168 p.

Descriptors: *Heavy metals, Pollutants, *Ecology, *Cadmium, Liquid wastes, Oxidation-reduction, Analytical techniques, Biosphere, Plastics, Filter paper, Fluids, *Pollutant identification, *Path of pollutants.
Identifiers: Preanalysis concentration, Optical paths.

To determine the concentration of heavy metal pollutants in the ecological biosphere, large samples must be collected and/or there must be a preanalysis concentration step. A need exists for experienced personnel. A device has been designed for the direct determination of heavy metal pollutants by atomic absorption spectroscopy. This uses a carbon bed atomizer for the reduction of metal pollutants to free atoms, and a heated quartz long path absorption tube to maintain the atoms in the light path in the free atomic state. Use of the instrument includes determination of cadmium in the atmosphere, in seawater, in biological fluids, in filter papers, and in plastics. It is also calibrated for air analysis. Attempts are being made to eliminate contamination in calibrating media. (Prague-FIRL)
W74-10923

A PRELIMINARY EVALUATION OF A DISCRETE SAMPLE ANALYZER FOR CHEMICAL ANALYSIS OF WATER,
Quebec Dept. of Social Affairs.
R. St Jean, and S. S. Kasatiya.
Environmental Letters, Vol 6, No 3, p 193-203, 1974. 9 fig, 1 tab, 11 ref.

Descriptors: *Analytical techniques, *Water pollution sources, *Chemical analysis, *Instrumentation, *Pollutant identification, Water analysis, Chemical wastes, Potable water.
Identifiers: Discrete sample analyser.

The Beckman Discrete Sample Analyser (DSA-560) (KLiNa Accessory) was used to determine chlorides, fluorides, nitrates, nitrites, sodium, and potassium in drinking water samples. It was found to be precise, accurate, and rapid and was thought to be a potentially useful instrument in environmental analysis. However, it is necessary to continually supervise its use and ensure its careful handling. It is versatile, and requires small samples. (Murphy-FIRL)
W74-10936

SYMPOSIUM ON ENVIRONMENTAL QUALITY MONITORING; SYMPOSIUM ON SOURCES AND EVOLUTION OF THE ATMOSPHERIC AEROSOL; GENERAL PAPERS.
Available from ACS-Div of Environmental Chemistry, Carnegie-Mellon Univ, 4400 Fifth Ave, Pittsburgh, Penn 15213, Price $5.00 printed copy. Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, 1974, 370 p.

Descriptors: *Monitoring, *Path of pollutants, *Conferences, *Aerosols, Water treatment, Waste treatment, Water pollution, Air pollution, *Pollutant identification.

The 167th Annual Meeting of the American Chemical Society included discussions of environmental monitoring and of atmospheric aerosols. Waste treatment, water treatment, and the flow of trace elements through urban environments were also discussed. (See W74-10948 thru W74-11008) (Knapp-USGS)
W74-10947

EVOLUTION OF MONITORING FOR EARTHWATCH,
National Oceanic and Atmospheric Administration, Rockville, Md.
C. E. Jensen.

In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 1-6, 1974.

Descriptors: *Monitoring, *Pollutants, *Networks, *Environment, International commissions, Pollution abatement.
Identifiers: *Earthwatch.

Earthwatch is a global environmental assessment under the auspices of the new U.N. Environment Program. Earthwatch provides the needed framework for undertaking global environmental action, particularly in the area of monitoring. It provides for the international collaboration among nations, for the sharing of facilities and observational platforms, and for the assistance to developing countries to allow their full participation in global efforts. Earthwatch is built upon existing national and international capabilities and serves to integrate these capabilities using the Environment Fund to fill gaps where necessary and resulting in a comprehensive multidisciplinary global assessment effort. (See also W74-10947) (Knapp-USGS)
W74-10948

OPTIMIZATION OF WATER QUALITY MONITORING PROGRAMMES,
Michigan Univ., Ann Arbor. School of Public Health.
R. A. Deininger.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry Vol 14, No 1, p 7-10, 1974.

Descriptors: *Monitoring, *Water quality, Water quality control, Network design, *Optimization, Pollutant identification.

The first step in the design of a monitoring program is the establishment of a clear and unambiguous objective in quantitative terms. At the highest, or national level, information is necessary for broad planning purposes. At the second level, the regional level, all this information is necessary, plus the particular information needs for the region. The third, local level, consists usually of checking to ensure compliance with regulations and statutes. Ideally, the costs of collecting new data should be less than the benefits to be derived from these new data. (See also W74-10947) (Knapp-USGS)
W74-10949

VALIDATION OF ENVIRONMENTAL DATA BY INTERCALIBRATION AND LABORATORY QUALITY CONTROL PROGRAMS,
National Bureau of Standards, Washington D.C.
J. K. Taylor.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 11-15, 1974.

Descriptors: *Monitoring, *Laboratory tests, *Calibrations, *Analytical techniques, Chemical analysis, Data processing, Environment, Sampling, Standards, Statistics.
Identifiers: *Collaborative tests.

Accurate methodology, adequate calibrations, and systematic quality control procedures are required to provide reliable environmental quality data. A systems approach helps assure the validity of the data reported by individual stations and permits its incorporation into the body of data derived from diverse sources. The best method for development and evaluation of analytical methodology (and also for development of analytical expertise) is the time-consuming, evolutionary process of research, documentation in the literature, and critical examination by peers. A shorter and less adequate route is that of collaborative testing. A typical collaborative test consists of the circulation of identical samples to selected collaborators with the request to analyze by any familiar method. A second approach is to circulate a test material together with a specified method for measurement. (See also W74-10947) (Knapp-USGS)
W74-10950

NEED FOR COLLABORATIVE STUDIES OF STANDARD METHODS,
National Environmental Research Center, Cincinnati, Ohio. Water Supply Research Lab.
E. F. McFarren.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 16-20, 1974. 3 tab, 7 ref.

Descriptors: *Monitoring, *Laboratory tests, *Calibrations, Analytical techniques, Chemical analysis, Data processing, Environment, Sampling, Standards, Statistics.
Identifiers: *Collaborative tests.

Analytical quality control consists essentially of three programs or conditions: (1) using only methods that have been studied collaboratively and found acceptable, (2) routinely analyzing a control sample at least once on each day that unknown samples are analyzed, and (3) analyzing a few reference samples once or twice a year to confirm the ability of a laboratory to produce acceptable results. (See also W74-10947) (Knapp-USGS)
W74-10951

THE ASSESSMENT OF ENVIRONMENTAL IMPACT--WATER QUALITY AND QUALITY ASSURANCE CONSIDERATIONS,
Industrial Bio-Test Labs., Northbrook, Ill. Environmental Sciences Div.
J. J. Delfino.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 21-25, 1974.

Descriptors: *Monitoring, *Data collections, *Environment, Water quality act, Water quality, Pollution, Pollution abatement, Water pollution control, Pollutant identification.
Identifiers: *National Environmental Policy Act, *Environmental Impact Statements.

The widespread awareness and application of the philosophy and requirements of the National Environmental Policy Act of 1969 influence the way in which water quality surveys are now to be performed in support of environmental impact assessments. These surveys must be multidisciplined and consider physical and biological as well as chemical parameters. The work must be performed by well trained professionals who use modern techniques and instruments and who consistently practice good quality assurance procedures. If the quality of the large amount of water quality data now being generated matches the quantity, then meaningful impact assessments of the aquatic environment will result. Careful prior planning of long-term studies can yield valuable data which will aid in predicting potential environmental impacts and in forming the bases for designing alternative engineering solutions where needed. (See also W74-10947) (Knapp-USGS)
W74-10952

OVERVIEW OF THE CALIFORNIA AEROSOL CHARACTERIZATION EXPERIMENT,
Rockwell Science Center, Thousand Oaks, Calif.
G. M. Hidy, R. J. Charlson, S. K. Friedlander, D. Hutchison, and P. K. Mueller.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 26-28, 1974.

Descriptors: *Aerosols, *Smog, *California, Monitoring, *Air pollution, Pollution abatement, Sampling, *Pollutant identification.

Aerosols in urban and non-urban locations of California are studied in terms of their physical and chemical properties, their interaction with gases in the atmosphere, and their natural and anthropogenic origins. The amounts of atmospheric aerosol which can be related to primary emissions such as from auto exhausts or stationary sources, and secondary production due to physical and chemical processes taking place in the atmosphere are determined. Major sources of particles and chemically reactive gases which can be related to aerosol pollution and visibility reduction are identified. To characterize the behavior of urban aerosols, the physical and chemical properties of airborne particles are observed simultaneously with meteorological variables including winds, temperature, relative humidity and solar radiation, and trace gases including ozone, nitrogen oxides, ammonia, hydrocarbon vapors, carbon monoxide, hydrogen sulfide, and sulfur dioxide. (See also W74-10947) (Knapp-USGS)
W74-10953

PHYSICAL CHARACTERIZATION OF CALIFORNIA AEROSOLS,
Minnesota Univ., Minneapolis. Dept. of Mechanical Engineering.
K. T. Whitby, W. E. Clark, V. A. Marple, K. Willeke, and G. M. Sverdrup.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 29-32, 1974. 2 fig, 2 ref.

Descriptors: *Aerosols, *Smog, *California, Monitoring, *Air pollution, Pollution abatement, Sampling, Pollutant identification.

In 1972 the physical characteristics of aerosols were measured on several each of background, urban, and source related sites in the State of California as part of the Air Resources Board aerosol characterization study. In addition to meteorological and gas measurements, aerosols were sampled on filters, the Lundgren impactor, and several other special samplers. Aerosol size distributions were measured by optical counter, electrical aerosol analyzer, condensation nuclei counter, and rotary impactor. (See also W74-10947) (Knapp-USGS)
W74-10954

PHOTOCHEMICAL AEROSOL FORMATION IN THE ATMOSPHERE AND IN AN ENVIRONMENTAL CHAMBER,
California State Air Resources Board, El Monte.
For primary bibliographic entry see Field 5B.
W74-10955

SULFATE AND NITRATE CHEMISTRY IN PHOTOCHEMICAL SMOG,
Rockwell Science Center, Thousand Oaks, Calif.
G. M. Hidy, B. Appel, W. E. Clark, S. K. Friedlander, and R. Giauque.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 39-41, 1974. Air Resources Board Contract No 358.

Descriptors: *Smog, *Air pollution, *California, *Aerosols, *Sulfates, *Nitrates, Sampling, Pollutant identification.

The physical and chemical properties of airborne particles were observed at several different urban and non-urban sites in California. Meteorological and aerometric variables included such gases as water vapor, ozone, nitrogen oxides, ammonia, sulfur dioxide, hydrogen sulfide and reactive hydrocarbon vapors. The aerosol samples were collected sequentially at two hour intervals over a twenty-four hour period for chemical analysis using filters and impactors. Much of the total mass concentration of airborne particles is composed of sulfate, nitrate, ammonium, as well as other species. Circumstantial evidence supports the fact that most of the sulfur and nitrogen compounds in aerosols originate as gases and are transformed in the atmosphere to aerosols by reactions which are not exclusively photochemical in nature. (See also W74-10947) (Knapp-USGS)
W74-10956

CHARACTERIZATION AND ANALYSIS OF AIRBORNE PARTICULATE MATERIAL BY INFRARED SPECTROSCOPY,
Argonne National Lab., Ill. Chemical Engineering Div.
P. T. Cunningham, and S. A. Johnson.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 42-43, 1974.

Descriptors: *Air pollution, *Pollutant identification, *Aerosols, Illinois, California, Sampling, Neutron activation analysis, X-ray fluorescence, Flame photometry, Chemical analysis.

Analysis of the elemental composition of airborne particulate material can be accomplished in a routine manner through the use of neutron activation, x-ray fluorescence, and atomic absorbtion. There is significant variation in the chemistry of airborne particulates as a function of both particle size and time. Ammonium and sulfate ions account for the spectra of most stage IV (submicron) samples. Carbonate, nitrate, silica and silicate, and hydrocarbon are clearly present in stage II and III samples. The spectra particles collected on stage II and III frequently have a strong sharp band which is assigned to a surface nitrate species. This peak is seldom strong in stage IV samples collected in the Chicago area but was important in submicron samples collected in the Los Angeles basin. In general, the features observed in the spectra of stage II and III samples display a variability with time that is not clearly cyclic and appear to reflect the variability of local winds. This is consistent with the theory that particles greater than about one micron in diameter are introduced into the atmosphere by mechanical mechanisms. (See also W74-10947) (Knapp-USGS)
W74-10957

SENSORS FOR WATER AND WASTEWATER PROCESS CONTROL,
North Carolina Univ., Raleigh. Dept. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 5D.
W74-10958

MONITORING THE AQUATIC ENVIRONMENT FOR SPECIFIC ORGANIC POLLUTANTS,
Environmental Protection Agency, Athens, Ga. Surveillance and Analysis Div.
E. W. Loy, Jr., D. W. Brown, and J. H. M. Stephenson.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 47-53, 1974. 2 fig, 1 tab, 9 ref.

Descriptors: *Monitoring, *Pollutant identification, *Gas chromatography, *Mass spectrometry, Pesticides, Organic matter, *Organic compounds.

Gas chromatograph/mass spectrometer (GC/MS) systems are powerful tools for identifying specific environmental organic pollutants. Computerized GC/MS systems are especially suitable in a service laboratory doing routine monitoring of environmental samples. There are ten regional service laboratories and two National Field Investigation Center laboratories within EPA that have primary responsibility for environmental monitoring, industrial surveys, enforcement actions, and investigation of episodes such as fish kills or taste and odor problems. (See also W74-10947) (Knapp-USGS)
W74-10959

APPLICATION OF MONITORING TECHNOLOGY (FOR ASSURING) DRINKING WATER QUALITY,
National Sanitation Foundation, Ann Arbor, Mich.
For primary bibliographic entry see Field 5F.
W74-10960

WATER QUALITY MONITORING SYSTEMS FOR ENVIRONMENTAL WATER AND INDUSTRIAL EFFLUENT IN JAPAN,
Government Industrial Research Inst., Nagoya (Japan).
For primary bibliographic entry see Field 5G.
W74-10961

WASTE WATER MONITORING PROGRAM BY THE CITY OF NEW YORK,
New York City Environmental Protection Administration. Dept. of Water Resources.
For primary bibliographic entry see Field 5D.
W74-10962

VIRAL QUALITY MONITORING IN THE POLLUTED AQUATIC ENVIRONMENT,
Delaware Univ., Newark. Dept. of Chemistry.
For primary bibliographic entry see Field 5B.
W74-10963

THE URBAN PLUME OF ST. LOUIS,
Washington Univ., Saint Louis, Mo. Dept. of Mechanical and Aerospace Engineering.
For primary bibliographic entry see Field 5B.
W74-10964

H2SO4/(NH4)2SO4 AEROSOL: OPTICAL DETECTION IN ST. LOUIS REGION,
Washington Univ., Seattle. Dept. of Civil Engineering.
R. J. Charlson, A. H. Vanderpol, D. S. Covert, A. P. Waggoner, and N. C. Ahlquist.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry Vol 14, No 1, p 78-83, 1974. 1 fig, 1 tab, 11 ref.

Descriptors: *Smog, *Sulfates, *Air pollution, *Aerosols, Central US, *Missouri, Pollutant identification.
Identifiers: *Sulfuric acid, *St. Louis(Mo).

Sulfuric acid and its neutralization products with NH3 exist and often dominate the submicrometer aerosol in and near St. Louis, but these substances may be normal intermediates in the cycling of sulfur through the atmosphere. The lack of dependence of composition on wind direction or synoptic condition suggests that these substances are regionally distributed and are not urban. It is likely that human sources of SO2 dominate based on consideration of known source strengths of sulfur compounds in this region. The sources of SO2 (mainly fossil fuel power plants) are located on a spatial scale of from 10-100 km in Missouri and the surrounding states. These compounds, which dominate the hazes in eastern Missouri, may also extend to the entire midwest. Such visible, turbid air is noted in summer from perhaps Topeka to the East Coast and from Chicago to Little Rock and only really disappears with massive intrusions of Canadian air in winter. (See also W74-10947) (Knapp-USGS)
W74-10965

SO2 OXIDATION MECHANISM IN OLEFIN-NOX-SO2 SMOG,
National Environmental Research Center, Research Triangle Park, N.C.
For primary bibliographic entry see Field 5B.
W74-10966

DIRECT DETERMINATION OF THE TOTAL ATMOSPHERIC AEROSOL MASS DISTRIBUTION,
Minnesota Univ., Minneapolis.
D. A. Lundgren, and H. J. Paulus.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 88-94, 1974. 2 fig, 5 ref.

Descriptors: *Air pollution, *Aerosols, *Dusts, Sampling, Statistics, *Distribution patterns, Particle size, Turbidity, *Pollutant identification.

The mass distribution of large atmospheric particulate matter was studied as a function of particle aerodynamic size. Aerodynamic size is defined as the diameter of a unit density sphere which settles at the same rate as the actual particle. Measurements were made under various conditions of wind velocity and direction in order to investigate the effect wind and aerosol source had on the mass distribution. Atmospheric particulate matter tends to have a bimodal mass distribution. Based upon the overall average distribution, the small particle mode peaked at about 0.5 micron diameter. For all sampling conditions the atmospheric aerosol had a large particle mode which peaked between 10 and 20 micron diameter. The small particle mode accounts for only one-half the particulate mass but about 99 percent of the particulate surface area and visibility reduction. (See also W74-10947) (Knapp-USGS)
W74-10967

COMPARISON OF VOLUME AND MASS DISTRIBUTION FOR DENVER AEROSOLS,
National Environmental Research Center, Research Triangle Park, N.C.
For primary bibliographic entry see Field 5B.
W74-10968

MASS AND COMPOSITION OF AN URBAN AEROSOL AS A FUNCTION OF SIZE FOR SEVERAL VISIBILITY LEVELS,
National Environmental Research Center, Research Triangle Park, N.C.
For primary bibliographic entry see Field 5B.
W74-10969

NPDES SELF-MONITORING AND REPORTING REQUIREMENTS,
Environmental Protection Agency, Washington, D.C. Permit Programs Div.
For primary bibliographic entry see Field 5G.
W74-10970

AUTOMATED WET CHEMICAL ANALYSIS INSTRUMENTS FOR CONTINUOUS EFFLUENT MONITORING,
Technicon Industrial Systems, Tarrytown, N.Y.
For primary bibliographic entry see Field 5D.
W74-10971

USE OF CHEMICAL-SENSING ELECTRODES IN MONITORING,
Orion Research, Inc., Cambridge, Mass.
M. S. Frant.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 119-120, 1974. 2 tab.

Descriptors: *Monitoring, *Water pollution control, *Electrodes, Water analysis, Electrochemistry, Industrial wastes, Waste water treatment, *Pollutant identification.

Currently available chemical-sensing electrodes which are suitable for monitoring are discussed. Electrodes are relatively low cost devices, and have the advantages of responding in real time, of being able (as logarithmic devices) to cover a wide concentration range with the same precision, and of being able to function under adverse conditions of turbidity and color. By suitable chemistry, it is also possible to determine many species for which no specific electrode exists. (See also W74-10947) (Knapp-USGS)
W74-10972

APPLICATION OF ANALYTICAL INSTRUMENTATION TO INDUSTRIAL MONITORING OF AQUEOUS EFFLUENTS,
Union Carbide Corp., South Charleston, W. Va. Dept. of Engineering.
For primary bibliographic entry see Field 5B.
W74-10973

DETERMINATION OF TRACE ORGANIC COMPONENTS IN AQUEOUS WASTES,
Monsanto Co., Saint Louis, Mo.
For primary bibliographic entry see Field 5B.
W74-10974

WATER SAMPLING,
National Bureau of Standards, Washington, D.C.
For primary bibliographic entry see Field 5B.
W74-10975

MUSKEGON COUNTY WASTEWATER MANAGEMENT SYSTEM NO I,
Teledyne Triple R, Muskegon, Mich.
For primary bibliographic entry see Field 5D.
W74-10976

ENVIRONMENTAL ANALYSIS OF OCEAN DUMPING,
Raytheon Co., Portsmouth, R.I. Oceanographic and Environmental Services.
For primary bibliographic entry see Field 5B.
W74-10977

INDUSTRIAL WASTEWATER MONITORING: BASIC CONSIDERATIONS,
Tennessee Univ., Knoxville.
For primary bibliographic entry see Field 5D.
W74-10978

WASTE AND WATER MONITORING,
Dow Chemical Co., Midland, Mich.
For primary bibliographic entry see Field 5D.
W74-10979

AN AMPEROMETRIC MEMBRANE HALOGEN ANALYZER,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
J. D. Johnson, and J. W. Edwards.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 169-173, 1974. 5 fig, 2 tab. Army Contract No DADA 17-72-C-2053.

Descriptors: *Chlorination, *Monitoring, *Membrane processes, Water analysis, Chemical analysis, Water treatment, Water quality control, Membranes, *Pollutant identification.

If a membrane is used to allow halogen transport while excluding interferents an electrochemical or colorimetric reaction can be used to determine halogen residuals specifically. Halogens, in particular chlorine, are the most widely used chemical agents for water disinfection. Halogen residual measurements are a measure of water safety. These residuals are generally on the order of .2 to 1 mg/liter. (See also W74-10947) (Knapp-USGS)
W74-10980

TRACE ORGANIC CONTAMINANTS IN DRINKING WATER; EVALUATION OF SEMI-PERMEABLE MEMBRANES AND OSMOTIC PUMPING TO ACHIEVE CONCENTRATION,
Gulf South Research Inst., New Orleans, La.
For primary bibliographic entry see Field 5F.
W74-10981

TRACE ORGANIC CONTAMINANTS IN DRINKING WATER; THEIR CONCENTRATION BY REVERSE OSMOSIS,
National Environmental Research Center, Cincinnati, Ohio.
For primary bibliographic entry see Field 5F.
W74-10982

TRANSMETHYLATION OF HEAVY METAL IONS IN WATER,
National Bureau of Standards, Washington, D.C.
For primary bibliographic entry see Field 5B.
W74-10983

COLORIMETRIC METHOD FOR THE DETERMINATION OF ARSENIC (III) IN AQUATIC ENVIRONMENT,
South Carolina State Coll., Orangeburg. Water Lab.
S. S. Sandhu, and R. Krishnamurthy.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, division of Environmental Chemistry, Vol 14, No 1, p 226-229, 1974. 8 ref.

Descriptors: *Arsenic compounds, *Chemical analysis, *Analytical techniques, Oxidation, Reduction(Chemical), Colorimetry, *Pollutant identification.

A simple analytical method is given for quantitative evaluation of arsenic (III) in an aquatic environment. Arsenic (III) is a reducing agent. Iodate ion is a good oxidizing agent and it is reduced by arsenic (III) to iodine. The liberated iodine is immediately extracted with carbon tetrachloride, which forms a loose complex imparting a characteristic pink color to the extractant. Iodine in organic phase is colorimetrically evaluated and arsenic (III) calculated. (See also W74-10947) (Knapp-USGS)
W74-10984

THE CARBON ROD ATOMIC ABSORPTION ANALYSIS OF ARSENIC IN PLANT AND ANIMAL TISSUES,
Los Angeles County Sanitation Districts, Whittier, Calif. San Jose Creek Water Quality Lab.
R. Baird, and S. Gabrielian.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 230-233, 1974. 3 tab, 7 ref.

Descriptors: *Flame photometry, *Spectrophotometry, *Arsenic compounds, *Pollutant identification, *California, Path of pollutants, Chemical analysis.
Identifiers: Atomic absorption spectrophotometry, Los Angeles County(Calif).

Carbon rod techniques for atomic absorption were successfully employed for the analysis of arsenic in wastewaters, sediments, plants, and marine animals. Lyophilization followed by acid digestion (ambient pressure) or acid bomb digestion (high pressure) offers the most promising methods of preparing representative biological samples for atomic absorption analysis of arsenic. There is no clear gradient of arsenic concentrations in fish and shellfish specimens collected around the Los Angeles County Palos Verdes sewage outfall. The levels of arsenic found in brown algae (kelp) specimens seem to be higher near the point of discharge. (See also W74-10947) (Knapp-USGS)
W74-10985

EVALUATION OF DIGESTION TECHNIQUES FOR THE AAS DETERMINATION OF METAL CONCENTRATIONS IN KELP,
Los Angeles County Sanitation Districts, Whittier, Calif. San Jose Creek Water Quality Lab.
S. Pourian, M. Smith, S. Gabrielian, and R. Baird.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 237-244, 1974. 3 tab, 7 ref.

Descriptors: *Flame photometry, *Spectrophotometry, *Arsenic compounds, *Pollutant identification, *California, Path of pollutants, Chemical analysis.
Identifiers: Atomic absorption spectrophotometry.

Approximately half of the metal loadings in the Southern California coastal waters result from the discharge of treated domestic and industrial wastes from sewage treatment plants. Kelp stands near the major Los Angeles County outfall contain metal concentrations significantly higher than those farther away from the discharge point. In order to differentiate between the concentrations of cellular metals and surface-absorbed metals, the washing technique does not leach metals from the cells. Atomic absorption spectroscopy is the analytical tool used. (See also W74-10947) (Knapp-USGS)
W74-10986

THE FLOW OF TRACE ELEMENTS THROUGH THE LOS ANGELES BASIN: ZN, CD, AND NI,
California Inst. of Tech., Pasadena. W. M. Keck Lab. of Environmental Health Engineering.
For primary bibliographic entry see Field 5B.
W74-10987

DETERMINATION OF CHLORINATION EFFECTS ON ORGANIC CONSTITUENTS IN SEWAGE TREATMENT PLANT EFFLUENTS: A COUPLED 36CL TRACER--HIGH-RESOLUTION CHROMATOGRAPHIC TECHNIQUE,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5D.
W74-10989

LIGHT ENERGIZED OXIDATION OF ORGANIC WASTES,
Montana State Univ., Bozeman. Dept. of Civil Engineering and Engineering Mechanics.
For primary bibliographic entry see Field 5D.
W74-10990

THE DETERMINATION OF BENZIDINE IN WASTEWATERS,
Los Angeles County Sanitation Districts, Whittier, Calif. San Jose Creek Water Quality Lab.
R. Jenkins, C. Kuo, and R. Baird.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 273-277, 1974. 6 ref.

Descriptors: *Organic compounds, *Chromatography, *Spectrophotometry, *Pollutant identification, Waste water treatment, Analytical techniques, Chemical analysis.
Identifiers: *Benzidine.

The most useful technique for the estimation of benzidine in wastewater is a colorimetric determination of aniline derivatives. Although thin layer chromatography (TLC) and gas-liquid chromatography have not been described specifically for the analysis of benzidine in aqueous systems, they present possibilities as analytical tools. Qualitative IR identifications of benzidine and other aromatic amines were performed on a spectrophotometer which was fitted with a beam condenser having KBr optics. Compounds developed by TLC were extracted from Silica Gel G with 2 ml of spectrograde methanol, and concentrated to 0.5 ml. From 5-10 microliters of this extract were directly administered to dried spectroscopic grade KBr in a 1.5 mm ultra-micro pellet die before evacuation and pressing. This technique was capable of producing satisfactory spectra on as little as 1 microgram of benzidine using a 20x scale expansion of the instrument. For identification, spectra were compared to 1-10 microgram benzidine standards prepared in 1.5 mm pellets. (See also W74-10947) (Knapp-USGS)
W74-10991

CHEMICAL PROFILES OF KRAFT PAPER MILL TREATED WASTEWATERS,
Environmental Protection Agency, Athens, Ga. Southeast Environmental Research Lab.
For primary bibliographic entry see Field 5D.
W74-10992

COAL HUMATES FOR THE REMOVAL OF WATER POLLUTANTS ASSOCIATED WITH THE USE OF COAL,
Missouri Univ., Columbia. Dept. of Chemistry.
For primary bibliographic entry see Field 5D.
W74-10993

THE ELEMENTAL COMPOSITION OF THE AEROSOL IN PASADENA, CALIFORNIA,
Ford Motor Co., Dearborn, Mich. Dept. of Chemistry.
R. H. Hammerle, and W. R. Pierson.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 285-286, 1974.

Descriptors: *Air pollution, *Dusts, Fallout, Aerosols, *California, Lead, Nickel, Zinc, Calcium, Bromine, *Pollutant identification.
Identifiers: Pasadena(Calif).

To determine the sources of the aerosol in Pasadena, California, particulate samples were collected almost continuously for 29 days from 30 October to 27 November, 1972. Two filters, which were changed simultaneously every 2 hours, were used to collect particles in 2 size ranges: from about 20 microns to 0.01 microns and from 1.5 microns to 0.01 microns in diameter. The elemental compositions of the two sets of filters were analyzed by an X-ray fluorescence spectrometer. Pb and Br meet criteria for automobile exhaust particulates, and Fe, Ti, and Mn meet criteria for soil dust. Ni and Zn come from 2 different sources, different from one another and different from automobile exhaust and soil dust. It appears likely that the measured Ca, above that expected from the soil dust, comes from cement and that the Ni comes from fuel oil fly ash. Primary automobile exhaust particulate matter contibutes 17% of the total particulate mass, soil dust contributes 26%, cement dust contributes less than 1%, fuel oil fly ash contributes about 2%. The average particulate mass during the November 16-27 period was 31.7 micrograms per cu m. (See also W74-10947) (Knapp-USGS)
W74-10994

A SPECTROSCOPIC STUDY OF PASADENA SMOG,
National Environmental Research Center, Research Triangle Park, N.C.
P. L. Hanst, W. E. Wilson, R. K. Patterson, B. W. Gay, and L. W. Chaney.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 287-294, 1974. 5 fig, 1 tab.

Descriptors: *Air pollution, *Smog, *California, Nitrates, Organic compounds, Sampling, *Spectroscopy, Infrared radiation, Ozone, Pollutant identification.
Identifiers: Pasadena(Calif).

An application of long path infrared spectroscopy to air pollution in Pasadena yielded data of value in interpreting the chemistry of the smog. In the late summer of 1972 a Fourier Transform spectrometer and long path cell were set up on the roof of the Keck Engineering Building at the California Institute on Technology. In the summer period the carbon monoxide and hydrocarbon levels were about half as high as on Fall mornings and evenings. On July 24 and 25, 1973, ozone concentrations reached 0.60 and 0.68 ppm. On those days, carbon monoxide was only about 3 ppm, methane 2 ppm, and non-methane hydrocarbon about 1.0 ppm carbon. Acetylene was 0.030 ppm and ethylene only 0.007 ppm, reflecting the stagnant condition of the air and the high extent of reaction. Formic acid was identified as the organic reaction product in highest concentration, at 0.050 ppm. A substantial portion of the hydrocarbon in the air was oxidized by the end of the day. Because the only gaseous nitrate was peroxy acetyl nitrate, which only accounts for about one-fourth of the input NO, it is presumed that particulate nitrate was formed. (See also W74-10947) (Knapp-USGS)
W74-10995

PHOTOCHEMICAL REACTIONS IN A DUAL OUTDOOR SMOG CHAMBER,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
H. Jeffries, D. Fox, R. Kamens, and L. Ripperton.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 295-297, 1974. 1 fig.

Descriptors: *Air pollution, *Chemical reactions, Equipment, Sampling, Solar radiation, Monitoring, Pollutant identification.

A dual smog chamber is enclosed by clear 5 mil PEP Teflon film. The chamber allows the reactants to be exposed to ambient sunlight and temperature profiles as they exist during the daytime. By having two compartments exposed to the same ambient conditions, it is possible to measure directly the effects of different reactant concentrations. The facility is designed to investigate the chemical behavior of urban atmospheric pollution. (See also W74-10947) (Knapp-USGS)
W74-10996

KINETIC STUDIES OF THE STABILITIES OF CHLOROMETHYL METHYL ETHER AND BIS (CHLOROMETHYL) ETHER IN HUMID AIR,
Dow Chemical Co., Midland, Mich.
For primary bibliographic entry see Field 5B.
W74-10997

CARBON-MONOXIDE-INDUCED PARTICLES FROM HOPCALITE CATALYST,
Naval Research Lab., Washington, D.C.
For primary bibliographic entry see Field 5B.
W74-10998

THE PRODUCTION RATE OF SULFATE AEROSOL IN THE STRATOSPHERE: ENVIRONMENTAL IMPLICATIONS OF A STRATOSPHERIC AIRCRAFT FLEET,
California Inst. of Tech., Pasadena. W. M. Keck Lab. of Environmental Health Engineering.
For primary bibliographic entry see Field 5B.
W74-10999

DETECTION OF HYDROCARBONS BY CHEMILUMINESCENCE WITH ACTIVE NITROGEN AT 388 NM,
Environmental Protection Agency, Research Triangle Park, N.C.
T. W. Baity, W. A. McClenny, and J. P. Bell.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 310-312, 1974. 2 tab.

Descriptors: *Monitoring, *Air pollution, Smog, Organic compounds, Nitrogen, Instrumentation, Fluorescence, Analytical techniques, Pollutant identification.
Identifiers: *Chemiluminescence.

A chemiluminescent method measures the hydrocarbon levels in a gas sample by the intensity of the individual hydrocarbon reactions with active nitrogen. Of all the hydrocarbons tested propylene gave the largest response. At 100 ppm the signal for propylene is about ten times greater than the background signal measured with zero air in the sample inlet. Since the minimum measurable concentration of even the more responsive hydrocarbons is greater than 1 ppm, the system in present form is suitable only for mobile source emissions measurements, and not for ambient air monitoring. (See also W74-10947) (Knapp-USGS)
W74-11000

A COLORIMETER SYSTEM FOR DETERMINATION OF THE METHOD 6 THORIN TITRATION ENDPOINT,
National Environmental Research Center, Research Triangle Park, N.C.
C. E. Rodes.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 313-320, 1974. 4 fig, 2 tab, 2 ref.

Descriptors: *Air pollution, *Pollutant identification, *Sulfates, *Volumetric analysis, *Color reactions, Monitoring, Sulfur.
Identifiers: *Sulfur dioxide.

The analysis of stack concentrations of SO2 has always been uncertain especially when the analyses must be made in the field. Consistent determination of the thorin titration endpoint, in which the solution color changes from a straw yellow to a pink-orange is difficult. An automatic titrator was designed to assist in determining the endpoints, and to speed up the analyses of multiple samples. A strip chart recorder is used with a peristaltic pump. A simple endpoint detection system is rugged enough to take into the field. (See also W74-10947) (Knapp-USGS)

W74-11001

OPERATION CHARACTERISTICS OF NO2 PERMEATION DEVICES,
National Bureau of Standards, Washington, D.C.
H. L. Rook, E. E. Hughes, R. S. Fuerst, and J. H. Margeson.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 321-328, 1974. 6 fig, 1 tab, 7 ref.

Descriptors: *Chemical analysis, *Nitrogen compounds, *Air pollution, *Pollutant identification, Separation techniques.
Identifiers: *Nitrogen dioxide.

Permeation devices can produce reliable calibration atmospheres of trace NO2 if careful controls are replaced on the gravimetric calibration and use of the devices. Conditions which would effect permeation rate and long term stability were studied. Parameters studied include temperature, humidity, physical shock, NO2 purity, and calibration procedures. (See also W74-10947) (Knapp-USGS)
W74-11002

A PIEZOELECTRIC SENSOR FOR MERCURY IN AIR,
National Bureau of Standards, Washington, D.C.
E. P. Scheide, and J. K. Taylor.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 329-335, 1974. 4 fig, 9 ref.

Descriptors: *Air pollution, *Pollutant identification, *Mercury, *Monitoring, Instrumentation.
Identifiers: *Piezoelectric sensors.

A quartz piezoelectric crystal detector with gold on the electrode as the sensor substrate can be used for the detection of mercury vapor in an air sample. Linear calibration curves were obtained from part per million to sub part per billion concentrations. Reversibility was achieved by a heat desorption cycle. This detector has potential use as both an air pollution sensor and in industrial hygiene applications. Instrumentation is relatively inexpensive and can be easily used in the field. Analysis is nondestructive and requires very little time. (See also W74-10947) (Knapp-USGS)
W74-11003

THE FLUORESCENCE DETECTION OF NITRIC OXIDE,
National Bureau of Standards, Washington, D.C.
F. P. Schwarz, and H. Okabe.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 336-343, 1974. 2 fig, 2 tab, 6 ref.

Descriptors: *Monitoring, *Air pollution, Smog, Organic compounds, Nitrogen, Instrumentation, Fluorescence, Analytical techniques, Oxides, *Pollutant identification.
Identifiers: *Chemiluminescence, Nitric oxide.

NO can be detected in NO-air mixtures and in automobile exhaust. The principle of detection is based on measuring the intensity of the fluorescence of NO excited by light of wavelength 2138A. The fluorescence intensity is proportional to the product of the NO concentration multiplied by the 2138A light intensity. Photon counts of both the fluorescence intensity and the 2138A light intensity are converted into a ratio which is proportional only to the NO concentration in a gas mixture. The SO2 present in automobile exhaust also absorbs the 2138A radiation but fluoresces at a longer wavelength region. It would not interfere with the NO measurement if a proper fluorescence transmission filter is used. (See also W74-10947) (Knapp-USGS)
W74-11004

CHEMICAL ANALYSIS OF THE SMOKY-BURNT ODOR COMPLEX IN DIESEL EXHAUST,
Little (Arthur D.), Inc., Cambridge, Mass.
A. B. Caragay, D. A. Kendall, and P. L. Levins.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 344-349, 1974. 2 tab, 2 ref.

Descriptors: *Air pollution, *Odor, *Organic compounds, Oil, Air pollution effects, *Pollutant identification, *Chemical analysis.

The smoky odor character of diesel exhaust is associated with hydroxy and methoxy indanones with some contributions from methyl and methoxy phenols. Burnt odors are associated with furans and alkyl benzaldehydes. The oxidized oily character is usually ascribed to alkenones, dienones, hydroxy cyclocarbonyls, and indanones. Irritation factors seem most frequently to be associated with the lower molecular weight phenols. Some benzaldehydes and methoxy benzenes may also contribute to this sensation. Neither sulfur nor nitrogen-containing species contribute to the smoky-burnt odor complex. The major source of the most significant odor contributors in this group appears to be the aromatic portion of the fuel, although some contribution is also from the paraffin portion. (See also W74-10947) (Knapp-USGS)
W74-11005

CARCINOGENIC SOURCES IN FISH TUMORS FOUND IN THE FOX VALLEY WATER SHED,
Illinois Benedictine Coll., Lisle.
For primary bibliographic entry see Field 5C.
W74-11006

AN AUTOMATED INSTRUMENT FOR THE CONTINUOUS MEASUREMENT OF REACTIVE HYDROCARBONS,
Ontario Research Foundation, Sheridon Park.
S. C. Barton, and E. N. Turner.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 356-359, 1974. 1 fig, 9 ref.

Descriptors: *Monitoring, *Air pollution, *Organic compounds, Smog, Colorimetry, Chemical reactions, Radioactive wastes, *Pollutant identification, Instrumentation, Automation.
Identifiers: *Radioactive hydrocarbon.

A method for monitoring reactive hydrocarbons is based upon the relative reactivity of different hydrocarbons with ozone. An air sample flows through a small photochemical reactor in which all hydrocarbons react in proportion to their photochemical reactivity to form aldehydes and ketones as major reaction products. Colorimetric determination of the total carbonyl products then provides a direct measurement of the total photochemical reactivity of the hydrocarbons in the air. (See also W74-10947) (Knapp-USGS)
W74-11007

INTERCOMPARISON OF SEVERAL TYPES OF CASCADE IMPACTORS,
Maryland Univ., College Park. Dept. of Chemistry.
G. E. Gordon, E. S. Gladney, J. M. Ondov, T. J. Conry, and W. H. Zoller.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 367-370, 1974. 1 fig, 9 ref.

Descriptors: *Sampling, *Dusts, *Aerosols, *Air pollution, Equipment, Calibrations, Particle size, *Pollutant identification.
Identifiers: *Cascade impactors.

Size distribution of atmospheric particles is found by separation of the particles into various size ranges with a cascade impactor prior to the analysis. This study is designed to determine the seriousness of wall losses and bounce-off for three types of impactors in common use. In the first series of experiments, three types of impactors and a filter were run side by side for comparison of apparent size distributions for certain elements. Then two identical impactors were run side by side, one with plastic collections surfaces, the other with plastic to which a sticky material had been added in order to prevent bounce-off. The three impactors were: a 4-stage Lundgren, a five-stage Andersen Sampler as modified for use by the National Air Surveillance Network, and a six-stage Scientific Advances Impactor. (See also W74-10947) (Knapp-USGS)
W74-11008

A NATIONAL OVERVIEW OF EXISTING COASTAL WATER QUALITY MONITORING.
Interstate Electronics Corp., Anaheim, Calif. Oceanics Div.
Available from NTIS, Springfield, Va 22161 as PB-226 483, Price $10.00 printed copy; $2.25 microfiche. Contract Report 445-A, Phase A, for Environmental Protection Agency, December 6, 1972. 514 p, 9 fig, 35 tab, 15 append. EPA Contract 68-01-0160.

Descriptors: *Monitoring, *Water quality, *Coasts, *Estuaries, Sea water, Water pollution sources, Water pollution control, *Data collections.

An overview of coastal water quality monitoring activity is presented, including an examination of related factors such as water quality standards, population, waste discharges, ocean dumping, and a survey of data banks at the national level. This broadly based information, supported by detailed data from selected case study areas, is for use in the formulation of a national plan for monitoring coastal water quality. Data from several inventories pertinent to coastal zone water quality are summarized to the state and EPA regional level with extensive descriptions contained in appendices. In general, no significant correlative relationship was found between monitoring activities and any of the other factors studied. However, a large amount of data was accumulated, summarized and presented in a form useful in the management and planning of coastal zone water quality monitoring networks. (Knapp-USGS)
W74-11010

CTD SENSORS, SPECIFIC CONDUCTANCE AND THE DETERMINATION OF SALINITY,
North Carolina State Univ., Raleigh. Inst. of Marine Sciences.
For primary bibliographic entry see Field 7B.
W74-11033

THE USE OF AN ELECTRON CAPTURE DETECTOR FOR THE DETERMINATION OF PESTICIDES IN WATER,
Ustav Hygieny, Bratislava (Czechoslovakia).
J. Uhnak, M. Sackmauera, A. Szokolay, and O. Palusova.
Journal of Chromatography, Vol 91, p 545-547, April 24, 1974. 10 ref.

Descriptors: *Chlorinated hydrocarbon pesticides, Instrumentation, Analytical techniques, DDT, Rivers, Europe, Groundwater.
Identifiers: BHC, Hexachlorocyclohexane, Czechoslovakia, Danube.

Traces of chorinated insecticides in water could be determined with an electron capture detector which gave a linear response for BHC (benzene hexachloride, hexachlorocyclohexane) and DDT isomers and metabolites in the range from 0.03 to 1.20 microgram/ml. The BHC and DDT contents in Slovakian rivers ranged from 0.01 to 0.80, in the Danube from 0.01 to 0.60, and in ground waters from 0.02 to 0.30 microgram/liter in the years 1971/72. The DDT content was lower than the content of BHC residues. These results agree with the actual consumption of chlorinated insecticides in the agricultural areas studied. (Brown-IPC)
W74-11077

APDC-MIBK EXTRACTION SYSTEM FOR THE DETERMINATION OF COPPER AND IRON IN 1 CU CM OF SEA WATER BY FLAMELESS ATOMIC-ABSORPTION SPECTROMETRY,
Kiel Univ. (West Germany). Institut fuer Meereskunde.
K. Kremling, and H. Petersen.
Analytica Chimica Acta, Vol 70, No 1, p 35-39, May 1974. 2 fig, 2 tab, 8 ref.

Descriptors: *Copper, *Iron, *Analytical techniques, *Seawater, Spectrophotometry, Chelation, Separation techniques.
Identifiers: Atomic absorption spectrometry.

A method for the simultaneous determination of trace amounts of Cu and Fe in 1 ml samples of oceanic waters is described. It is based on the chelation of the metals with ammonium pyrrolidine dithiocarbamate (APDC), extraction of the chelates with methyl isobutyl ketone (MIBK), and flameless atomic-absorption spectrometry with a HGA-72 graphite atomizer. Replicate analyses of Atlantic ocean water with mean Cu and Fe concentrations of 1.6 and 3.5 microgram/liter showed standard deviations of 14 and 17%, respectively. (Brown-IPC)
W74-11078

A POTENTIOMETRIC METHOD FOR THE DETERMINATION OF CHLORIDE IN BOILER WATERS IN THE RANGE 0.1 TO 10 MICROGRAM PER ML OF CHLORIDE,
Central Electricity Generating Board, Leatherhead (England). Central Electricity Research Lab.
K. Torrance.
The Analyst, Vol 99, No 1177, p 203-210, April 1974. 1 fig, 7 tab, 5 ref.

Descriptors: *Water analysis, *Boiler feed water, *Chlorides, *Analytical techniques, Electrodes, Potentiometers, Instrumentation, Corrosion control, Inhibition, Additives, Industrial water, Water purification, Monitoring, Water quality control.

A microanalytical method for measuring trace amounts of chloride ions in boiler feed waters is described, which utilizes the potential of a Ag/AgCl wire electrode vs. a Hg(I) sulfate reference electrode immersed in a buffered solution of the sample. The method was tested for chloride concentration ranges from 0.1 to 10.0 micrograms per ml. Standard deviations of results of 0.1, 1.76, and 10.0 micrograms/ml were 0.04, 0.06, and 0.2 microgram/ml, respectively. Substances normally present in boiler water do not appreciably interfere with chloride potentiometry, but octadecylamine and similar corrosion inhibitors would make the method unsuitable. (Brown-IPC)
W74-11079

ANALYSES OF PAPER MACHINE WATERS WITH ION-SPECIFIC ELECTRODES. PART I. EFFECT OF PH AND IONIC STRENGTH OF SOLUTION ON CALCIUM, CUPRIC, CHLORIDE, SODIUM, AND NITRATE ION SPECIFIC ELECTRODES,
Valmet Oy, Jyaskyla (Finland).
J. Korhonen, P. O. Lumme, and L. J. Kinnunen.
Paperi ja Puu (Papper och Tra), Vol 55, No 8, p 559-561, 564-566, 569-570, Aug 1973. 11 fig, 10 tab, 9 ref.

Descriptors: Water analysis, Waste water(Pollution), Analytical techniques, *Electrodes, *Anions, *Cations, *Potentiometers, *Pulp wastes, Water pollution sources, *Pollutant identification, Instrumentation, Hydrogen ion concentration, Industrial water, Industrial wastes, Calibration, Ions, Chemical analysis, Calcium, Chlorides, Copper, Sodium, Nitrates, Thermodynamics.
Identifiers: *White water(Paper machine effluent), Concentration(Chemicals), Ionic strength.

The purpose of this study was to measure the concentrations of various cations and anions that are generally present in paper-machine waste waters (white water), using ion-specific electrodes, and to define the factors influencing electrode calibration and direct concentration measurements. After an initial examination of the pH dependence of electrode potentials, the results were used to estimate the pH ranges in white waters over which the electrode behavior was independent of pH. The effect of ionic strength on electrode response was also explored. Electrode potentials were shown to follow the ionic activity factor's dependence upon ionic strength. (See also W74-11094) (Brown-IPC)
W74-11093

ANALYSES OF PAPER MACHINE WATERS WITH ION-SPECIFIC ELECTRODES, PART II. CALCIUM, CUPRIC, CHLORIDE, SODIUM AND NITRATE ION SPECIFIC ELECTRODE POTENTIALS AT VARIOUS TEMPERATURES AND IN COMPOSITE SOLUTIONS,
Valmet Oy, Jyaskyla (Finland).
J. Korhonen, P. O. Lumme, and L. J. Kinnunen.
Paperi ja Puu (Papper och Tra), Vol 55, No 9, p 646-648, 651-652, 655-656, Sept 1973. 4 fig, 9 tab, 7 ref.

Descriptors: Water analysis, Waste water(Pollution), Analytical techniques, *Electrodes, *Anions, *Cations, *Potentiometers, *Pulp wastes, Water pollution sources, *Pollutant identification, Instrumentation, Temperature, Thermal pollution, Calibrations, Ions, Chemical analysis, Calcium, Chlorides, Copper, Sodium, Nitrates, Industrial water, Water sampling.
Identifiers: *White water(Paper machine effluent), Concentration(Chemicals).

The effect of temperatures typical of white waters (paper machine effluent) on the electrode potentials of various contaminant ions (Ca, Cu, Na, chloride, and nitrate) was measured in order to estimate the admissible standard and sample temperature differences. Interferences were studied by measurements in pure metal chloride and sodium salt solutions. The accuracy of the electrodes was tested in a synthetic white water formulation. Based on the results obtained, recommendations are made for achieving maximum accuracy in direct concentration measurements. (See also W74-11093) (Brown-IPC)
W74-11094

THE DETERMINATION OF VANADIUM IN SEA WATER BY HOT GRAPHITE ATOMIC ABSORPTION SPECTROMETRY ON CHITOSAN AFTER SEPARATION FROM SALT,
Bologna Univ. (Italy).
R. A. A. Muzzarelli, and R. Rocchetti.
Analytica Chimica Acta, Vol 70, No 2, p 283-289, June, 1974. 3 fig, 3 tab, 9 ref.

Descriptors: *Sea water, *Analytical techniques, *Water analysis, *Chemical analysis, *Pollutant identification, Water pollution, Ion exchange, Trace elements, Water chemistry, Metals, Spectrometers, Anion exchange.
Identifiers: *Vanadium, Chitosan, *Italy(Cape Conero).

A method has been developed for the determination of V in sea water. It is based on the anion-exchange behavior of chitosan toward the metavanadate ion. Filtered and acidified sea water is passed through a 500mg chitosan column, and the V is determined by atomic absorption spectrometry with a graphite furnace and a deuterium background corrector on 5mg aliquots of the homogenized column. The procedure is suitable for use on board ships, as many samples can be handled by one technician; the columns can run unattended and can be sealed and stored for later analysis. Because only a small aliquot of the polymer from a column is used for a determination, replicate analyses can be done on the same column, and the residue can be stored indefinitely. Vanadium can be eluted from a chitosan column with sulfuric acid or ammonia, and the column can be used again. Two sea water samples collected a few km offshore of Cape Conero, Ancona, Italy, gave 0.71 plus or minus 0.09 and 0.52 plus or minus 0.04 micrograms of V/l. (Witt-IPC)
W74-11109

FLUORIMETRIC DETERMINATION OF CARBOHYDRATES IN SEA WATER,
Kinki Univ., Osaka (Japan). Dept. of Fundamental Education.
H. Hirayama.
Analytica Chimica Acta, Vol 70, No 1, p 141-148, May 1974. 4 fig, 3 tab, 12 ref.

Descriptors: *Water analysis, *Sea water, *Carbohydrates, Fluorescence, Biochemical oxygen demand, Solutes, Activated carbon, Adsorption, Electrodialysis, Ion exchange, Desalination, Sewage, Fluorescence, Spectroscopy, Analytical techniques, Waste identification, *Pollutant identification.
Identifiers: Hexoses, Pentoses, Furfural, Glucose.

Fluorimetry of pentoses with anthrone and of hexoses with 5-hydroxy-1-tetralone was used for analysis of sea water after preliminary separation of these sugars by adsorption on activated carbon and by ion-exchange electrodialysis. Activated carbon was suitable for the separation and concentration of hexose sugars but not of pentoses. Electrodialysis allowed complete desalination without loss of carbohydrates. The pentose and hexose contents could be determined after evaporation of sea water under reduced pressure. Several sea water samples were thus analyzed. Their pentose content (expressed as furfural) was 225-288 microgram/l, but their hexose content (expressed as glucose) varied widely from 250 to 1670 microgram/l, owing to contamination by sewage. (Brown-IPC)
W74-11110

MAKE WATER POLLUTION CONTROL A MEANINGFUL LOCAL RESPONSIBILITY,
Muncie Sanitary District, Ind., Water Quality Div.
J. M. Craddock.
The American City, Vol 63, No 4, p 63-64, May, 1974.

Descriptors: *Water quality control, *Monitoring, *Laboratory testing, Environmental effects, Pollution, Chemical oxygen demand, Dissolved solids, Suspended solids, Jar testing, Vacuum filters, Industrial wastes, Biochemical oxygen demand, Water resources, Costs, *Regulation, *Pollutant identification, *Indiana.
Identifiers: Local control, *Muncie(IN).

The Muncie Sanitary District has established a Division of Water Quality. The division is a testing and enforcement agency involved in laboratory

testing, industrial monitoring, and local government. Laboratory equipment includes an oil-extraction unit, COD apparatus, a pH meter, vacuum filter for suspended solids, jar test equipment, field dissolved oxygen meters, and automatic field samplers. More than 20 pollution discharges have been stopped. Because about 80 industrial and commercial establishments are in the Muncie area, samplers now monitor BOD5, COD, heavy metals, and suspended solids. Benefits relate to the community's public health, added recreational value of water resources, added revenue through equitable waste-industry charges, and regulation by local rather than state and federal agencies. (Prague-FIRL)
W74-11120

A STUDY OF THE POSSIBILITY OF INDICATING BACTERIA IN WATER BY A SPECTROULTRAMICROSCOPIC METHOD, (IN RUSSIAN),
Academy of Municipal Economy, Moscow (USSR). Research Inst. of Public Water Supply, Water Purification.
V. N. Artemova.
Gig Sanit. Vol 37 No 9 p 75-78, 1972. Illus.

Descriptors: *Electron microscopy, Filters, Bacteria, *Analytical techniques, *Bioindicators, Pollutant identification.
Identifiers: Bacillus anthracoides, Bacillus mesentericus, Escherichia coli, Shigella sonnei, Streptococcus faecalis.

An apparatus based on electronmicroscopy and fractional analysis with special light filters can be used to differentiate bacteria from each other and from other particles. This method is tested on water seeded with Escherichia coli, Shigella sonnei isolated from patients, Streptococcus faecalis, Bacillus mesentericus and B. anthracoides. Each bacteria appeared in a specific fraction except for Str. faecalis and B. mesentericus which, due to agglomeration or the presence of various stages of spore formation, appeared in several areas. This method could possibly be automated.--Copyright 1974, Biological Abstracts, Inc.
W74-11121

MERCURY ORGANIC MATTER ASSOCIATIONS IN ESTUARINE SEDIMENTS AND INTERSTITIAL WATER,
Florida State Univ., Tallahassee. Dept. of Oceanography.
For primary bibliographic entry see Field 5B.
W74-11122

HISTORY OF METAL POLLUTION IN SOUTHERN CALIFORNIA COASTAL ZONE,
Scripps Institution of Oceanography, La Jolla, Calif.
K. W. Bruland, K. Bertine, M. Koide, and E. D. Goldberg.
Environmental Science and Technology, Vol 8, No 5, p 425-432, May, 1974. 3 fig, 7 tab, 10 ref.

Descriptors: *Metals, *Pollution, *Sediments, *Measurements, Analytical techniques, Lead, Zinc, Chromium, Silver, Sampling, Water pollution, Human resources, Storm runoff, Coastal areas, Environmental effects, Atmosphere, *California, *Pollutant identification.
Identifiers: San Pedro(CA), Santa Monica(CA), Santa Barbara(CA), Anthropogenic fluxes.

Measurements were made of the anthropogenic and natural fluxes of elements into the sediments of the San Pedro, Santa Monica, and Santa Barbara Basins, off the coast of Southern California. Elements included Pb, Cr, Cd, Zn, Cu, Ag, V, and Mo. Use of the sedimentary record to reveal metal fluxes to the environment is dependent upon rapid removal of metal from water following its entry. By identifying those elements whose fluxes to the sediments as a result of human activities are significant compared with natural mobilization rates, transport paths from the continents to the sediments for individual elements are indicated. These account for waste outfalls, river and storm runoff, and composition of the atmosphere. Conclusions include marked similarity in the anthropogenic sedimentary fluxes and the rainfall fluxes, indicative that atmospheric transport of these metals to the coastal areas and the area of the Soledad Basin are a possible explanation. (Prague-FIRL)
W74-11130

MERCURY CONTAMINATION OF VEGETATION DUE TO THE APPLICATION OF SEWAGE SLUDGE AS A FERTILIZER,
Toronto Univ. (Ontario). Inst. of Environmental Sciences and Engineering; Toronto Univ. (Ontario). Dept. of Geology; and Toronto Univ. (Ontario). Dept. of Chemistry.
J. C. Van Loon.
Environmental Letters, Vol 6, No 3, p 211-218, 1974. 1 tab, 7 ref.

Descriptors: *Vegetation, *Mercury, *Sewage sludge, *Contamination, Soil contamination, Experimentation, Soil surfaces, *Tomatoes, Absorption.
Identifiers: Washed materials.

Vegetation grown on sludged and control plots were tested for mercury content. Washed and unwashed samples were tested. Materials tested included leaves and seeds of wild barley and quack grass; tomato roots, plants and fruit; bean roots, plants and pods; carrot roots and tops; and lettuce leaf. Only tomato fruit showed an increase in mercury levels for the washed plant material from the sludged plot. In this case, levels were up to fifty times higher than those of specimens from unsludged plots. Further investigation is recommended of surface contamination of vegetation by mercury containing dusts and soils which can cause elevated levels in unwashed material. (Prague-FIRL)
W74-11133

A METHOD FOR RAPID IDENTIFICATION OF TYPHOID AND DYSENTERY BACTERIA IN WATER,
Institute of General and Municipal Hygiene, Moscow (USSR).
For primary bibliographic entry see Field 5C.
W74-11162

HYGIENIC STANDARDIZATION OF THE PERMISSIBLE URANIUM CONTENT IN DRINKING WATER, (IN RUSSIAN),
Nauchno-Issledovatelskii Institut Gigieny, Moscow (USSR).
Yu. V. Novikov.
Gig Sanit. Vol 37, No 9, p 13-17, 1972. English summary.
Identifiers: *Uranium.

Hygienic investigations tried to substantiate scientifically the annual average permissible concentration (APC) of uranium in water for individual persons in the population at the level of 1.8 mg/l.--Copyright 1974, Biological Abstracts, Inc.
W74-11185

FLUORESCENCE SPECTROSCOPIC DETERMINATION OF ANTI-OVULATORY STEROIDS IN WATER AND WATER AND WASTE WATER ON THE THIN LAYER CHROMATOGRAPHY PLATE, (IN RUSSIAN),
Muenster Univ. (West Germany). Hygiene-Institut.
M. Kirchner, H. Holsen, and K. Norpoth.
Zentralbl Bakteriol Parasitenkd Infektionskr Hyg Erste Abt Orig Reihe B Hyg Praev Med Vol 157, No 1, p 44-52, 1973. Illus. English summary.

Descriptors: *Chromatography, *Fluorescence, Spectroscopy.
Identifiers: Chlormadinone acetate, Ethinyl estradiol, Ethynodiol, Lynestrenol, Medroxy, Megestrol, Mestranol acetate, Norethisterone, Noregestrel, Progesterone, Steroids.

Anti-ovulatory steroids can be determined quantitatively and qualitatively from aqueous media on the thin-layer chromatography plate by means of fluorescence spectroscopy. The procedure was tested for all the steroid components of anti-ovulatory preparations available in the Federal republic of Germany (ethinylestradiol, ethynodiol diacetate, chlormadinone acetate, lynestrenol, medroxyprogesterone acetate, megestrol acetate, mestranol, norethisterone acetate and norgestrel. With the exception of ethynodiol diacetate) all the compounds were clearly identified chromatographically because of their stability in double distilled water. The evaluation of the chromatogram with the Zeiss PMQ II spectrophotometer and Metrawatt's Servogor Recorder produced linear calibration functions in the lower nmole range. Megestrol acetate, which responded particularly sensitively, could still be detected quantitatively in amounts of 5-10 ng. The analytical method attains an accuracy of measurement of plus and minus 5% with triple determinations with the use of reference substances. In the determination of steroids in aqueous solutions, the loss of substance can amount to 8% of the expected value. The method has proved useful in ascertaining solubility in water and in various waste water tests as well as in the study of the decomposition of estrogens and progestagens in activated sludge.--Copyright 1974, Biological Abstracts, Inc.
W74-11195

WATER QUALITY PARAMETER MEASUREMENT USING SPECTRAL SIGNATURES,
Texas A and M Univ., College Station. Remote Sensing Center.
P. E. White.
Available from NTIS, Springfield, Va 22161 as N73-25141, Price $5.75 printed copy; $2.25 microfiche. Technical Report RSC-42, May 1973. 159 p, 25 fig, 23 tab, 23 ref, append. NASA Grant NGL 44-001-001.

Descriptors: *Remote sensing, *Water quality, *Regression analysis, Water pollution, Path of pollutants, Data collections, Data processing, Solar radiation, Pollutant identification.

Water quality parameters influence remotely sensed spectral signatures. Regression analysis was applied to the problem of measuring water quality parameters from remote sensing spectral signature data. The equations necessary to perform regression analysis and methods of testing the strength and reliability of a regression are described. An efficient algorithm is given for selecting the optimal subset of the independent variables available for a regression. To illustrate the regression techniques, they were applied to a particular set of data from the Houston Ship Channel. (Knapp-USGS)
W74-11230

EFFECT OF WASTE MANAGEMENT AND EGG PROCESSING ON THE FLAVOR OF COOKED EGGS,
Cornell Univ., Ithaca, N.Y. Dept. of Poultry Science.
For primary bibliographic entry see Field 5C.
W74-11236

QUALITY OF BERLIN SURFACE WATERS: MEASURING SCHEME, (DAS GUTEMESS PROGRAMM DER BERLINER OBERFLACHENGEWASSER),
H. Frenzel, and F. Sarfert.
Umwelthygiene, Vol 25, No 5, p 97-99, 1974. 1 fig, 2 ref.

Descriptors: *Water quality, *Surface water, *Measurement, *Data processing, Monitoring, Automation, *Pollution identification.
Identifiers: Physical parameters, Chemical parameters, Bacteriological parameters, *Biological parameters, *Radiological parameters, *Berlin(Germany).

A scheme to measure the quality of Berlin surface waters has been extended to 98 sampling points. The program includes the examination of physical/chemical, bacteriological, biological, and partly, radiological parameters. It was necessary to make arrangements between the particupating laboratories as to the methods of analysis to be used. The resulting data will be subject to automatic data processing. (Shaffer-FIRL)
W74-11252

HOW TO MEASURE AMBIENT POLLUTION,
Philips Gloeilampenfabrieken, Eindhoven (Netherlands).
S. M. de Veer.
La Tribune du Cebedeau, Vol 27, No 364, p 129-133, March, 1974. 5 fig, 6 ref.

Descriptors: *Monitoring, *Remote sensing, *Data transmission, Costs, Water pollution, Water quality measurement, Air pollution, Automation, *Pollutant identification.
Identifiers: Netherlands, Field measurement.

The best way to measure ambient pollution quite often depends on the reason why one wishes to measure it. Efficient control is only possible if the feedback control loop 'process-measurement-control' is closed and all three segments are working optimally. For adequate pollution control continuous measurement is required. Field monitoring is usually done without an operator or data processor on hand. Extra reliability of the monitoring equipment is therefore essential. Automatic calibration, representative sampling, proof against environmental influences, and automatic data transmission are necessities of remote monitoring. Examples are given of the development of monitors for air and water pollution meeting the above requirements. The application and costs of monitoring are discussed. (Shaffer-FIRL)
W74-11255

COUGHING FISH MAY MONITOR WATER QUALITY.
Chemical and Engineering News, Vol 52, No 20, p 64, May 20, 1974.

Descriptors: *Fish, *Water quality, *Monitoring, Bioassay, Mervury, Copper, *Bioindicators, Pollutant identification.

The tendency of some species of fish to 'cough' (or make a similar sound) may be useful in monitoring water quality in lakes and streams. Tests have shown that concentrations of copper and mercury that inhibit growth and reproduction also cause an increase in the frequency of coughing. The coughing is a normal process that clears the gills of debris. Fish known to exhibit this behavior include bluegill, sunfish, fathead minnows, and all trout and salmon. Testing is underway on ten heavy metals and pesticides to see if, indeed, this type of bioassay would be reliable. (Shaffer-FIRL)
W74-11257

WATER AND EFFLUENT INSTRUMENTATION MADE SIMPLE,
Taylor Instrument Companies, Rochester, N.Y.
C. Maddinson.
Water Services, Vol 78, No 938, p 116-117, April 1974. 5 fig.

Descriptors: *Sewage treatment, *Instrumentation, *Flow measurement, *Water pollution control, Application methods, Effluents, Pressure, Waste water treatment, *Pollutant identification.
Identifiers: Magnetic flow meter, United Kingdom.

A considerable amount of money will be spent in England during the next few years on sewage treatment representing a growth for the instrument industry, though instrumentation represents but a small percentage of the expenditures anticipated. Discussed are various sewage flow measurement techniques such as level, differential pressure, and venturi measurements or the use of a magnetic flow meter. Also mentioned are pollution control devices and applications to pumping and speed control. (Sandoski-FIRL)
W74-11258

THE SOLVENT EXTRACTION ATOMIC ABSORPTION ANALYSIS OF EFFLUENTS AND WATER,
Sussex River Authority (England).
A. Lloyd.
Water Pollution Control, Vol 73, No 2, p 224-229, 1974. 1 fig, 4 tab, 16 ref.

Descriptors: *Solvent extractions, *Spectrophotometry, *Analytical techniques, *Metals, Effluents, Effluent streams, *Pollutant identification.
Identifiers: *Ammonium pyrollidine dithiocarbamate/Methyl isobutyl ketone system, Wet oxidation, Atomic absorption spectrophotometry.

The application of solvent extraction atomic absorption spectrophotometry (AAS) to the analysis of effluents and stream samples provides a rapid and accurate means of determining a variety of metals at the microgram/liter level. The ammonium pyrollidine dithiocarbamate/methyl isobutyl ketone system, which uses simple AAS equipment, can be applied to an even wider range of metals including Ag, Hg, and As9. The most important step in the analysis is the extraction stage, and potential interferences are likely to be of a chemical nature involving a lowering of the extraction efficiency of the chelate. When wet oxidation is necessary or when the sample contains a diversity of metals at the mg/liter level, a double extraction is required. However, for relatively clean samples a single extraction is suitable. Standard addition offers the advantage of allowing a single extraction to be applied to a wide range of sample types. (Sandoski-FIRL)
W74-11260

A MODIFIED ION EXCHANGE TECHNIQUE FOR THE DETERMINATION OF STABILITY CONSTANTS OF METAL-SOIL ORGANIC MATTER COMPLEXES,
California Univ., Berkeley. Dept. of Soils and Plant Nutrition.
M. S. Ardakani, and F. J. Stevenson.
Soil Science Society of America Proceedings, Vol 36, No 6, p 884-890, November-December, 1972. 7 fig, 6 tab, 19 ref.

Descriptors: *Ion exchange, Humic acids, Humus, Chelation, *Analytical techniques, *Pollutant identification, *Organic matter, Soils.

Calculation methods based on Schubert's ion-exchange equilibrium method were developed for determining stability constants of metal-soil organic matter complexes. The methods, which were free of certain assumptions and errors inherent in the ion-exchange technique as applied previously to soil organic matter, were verified using Mn (II)-citrate and Mn (II)-oxalate systems. Apparent stability constants (log K) of Zn (II)-humic acid complexes varied from 3.13 to 5.13 at pH 6.5. (Skogerboe-Colorado State)
W74-11262

DETERMINATION OF TOTAL PHOSPHOROUS IN SOILS: A RAPID PERCHLORIC ACID DIGESTION PROCEDURE,
Purdue Univ., Lafayette, Ind. Agricultural Experiment Station.
For primary bibliographic entry see Field 2G.
W74-11273

A NEW MEIOFAUNA SAMPLER FOR QUANTITATIVE SAMPLING IN SOFT BOTTOMS, (EIN NEUER 'MEIOFAUNASTECHER' ZUR QUANTITATIVEN PROBENNAHME IN WEICHBODEN),
Kiel Univ. (West Germany). Zoologisches Institut.
For primary bibliographic entry see Field 7B.
W74-11313

CONTINUOUS-FLOW BIOASSAYS WITH AQUATIC ORGANISMS: PROCEDURES AND APPLICATIONS,
National Water Quality Lab., Duluth, Minn.
W. A. Brungs.
Biological Methods for the Assessment of Water Quality, American Society for Testing and Materials, Special Technical Publication 528, p 117-126, 1973. 23 ref.

Descriptors: *Bioassay, *Continuous-flow, *Methodology, Water quality, Water pollution, Testing, Testing procedures, Analytical techniques, Quality control, Monitoring, Aquatic animals.
Identifiers: *Dilution water, Toxicology.

Several types of continuous-flow methodology for toxicity bioassay are evaluated, and the advantages and disadvantages of each are discussed. Fail-safe devices, measured concentrations and care are essential to obtaining the best bioassay data. (Katz)
W74-11326

THE OCCURRENCE OF SOME TRACE METALS IN COASTAL ORGANISMS WITH PARTICULAR REFERENCE TO THE SOLENT REGION,
Southampton Univ. (England). Dept. of Oceanography.
For primary bibliographic entry see Field 5B.
W74-11332

THE UTILIZATION OF A SIMPLE EXPERIMENTAL DEVICE FOR STUDY OF WATER POLLUTION IN SITU: COMPARATIVE EFFECTS OF THREE ANTI-PETROLEUM EMULSIFYING AGENTS,
Museum National d'Histoire Naturelle, Paris (France). Laboratoire de Physiologie Generale et Comparee.
For primary bibliographic entry see Field 5C.
W74-11334

BIODEGRADATION OF MIREX BY SEWAGE SLUDGE ORGANISMS,
Florida Univ., Gainesville. Pesticide Research Lab.
For primary bibliographic entry see Field 5B.
W74-11345

DETERMINATION OF LEAD USING CHARGED PARTICLE ACTIVATION ANALYSIS,
Texas A and M Univ., College Station. Dept. of Chemistry.
D. C. Riddle, and E. A. Schweikert.
Analytical Chemistry, Vol 46, No 3, p 395-398, March, 1974. 1 fig, 6 tab, 22 ref.

Descriptors: *Lead, *Analytical procedures, Tracers, Radioisotopes, Trace elements, Distribution, *Pollutant identification.
Identifiers: *Activation analysis(Charged particle).

Investigations are reported of charged particle activation applied to the trace lead and lead isotope ratio analysis using proton, deuteron, and He-3 activation. Trace analysis methods were studied using the following nuclear reactions: Pb-206, 207 (p, xn)Bi-206, Pb-206, 207 (d, xn) Bi-206, Pb-206, 207, 208 (He-3, xn) Po-207, and Pb-206, 207 (alpha, xn) Po 207. In addition, a rapid, nondestructive technique based on the reaction Pb-206 (d, p) Pb-207m (t 1/2 = 800 msec) was evaluated and proton and deuteron activation were further examined for measuring Pb-204/Pb-206 ratios. Activation curves were determined for the reactions investigated and results of destructive and nondestructive determinations are presented. The detection limits were estimated at 0.01 ppm for proton and deuteron activation and at 0.1 and 0.2 ppm for He-3 and He-4 activation respectively. (Jernigan-Vanderbilt)
W74-11349

POTENTIOMETRIC MEASUREMENT OF COPPER IN SEAWATER WITH ION 1 = 1 SELECTIVE ELECTRODES,
Texas Instruments, Inc., Dallas.
R. Jasinski, I. Trachtenberg, and D. Andrychuk.
Analytical Chemistry, Vol 46, No 3, p 364-369, March, 1974. 6 fig, 4 tab, 18 ref.

Descriptors: *Copper, *Seawater, *Analytical techniques, *Potentiometers, Inorganic compounds, Organic compounds, On-site data collections, Electrochemistry, *Pollutant identification.

The data reported confirm that, with proper precautions in sample handling and measurement, the ionic cupric copper concentration of seawater can be monitored with ion-selective electrodes. The measured cupric ion content is identical to the total soluble cupric copper content when the electrode response is calibrated directly in seawater, to account for the inorganic complex ion distribution; when organic chelating agents with high stability constants relative to cupric ion are absent; and when the proper Nernstian slope is used in calculation. At and below 1 ppb copper, account must be taken of the injection of soluble copper (or silver) into solution by the sensor electrode. Seawater samples from three different sources were studied. The analysis of an open ocean water was straightforward. However, analysis of the near shore waters showed abnormalities which can be explained by the presence of small quantities of chelating agents. (Jernigan-Vanderbilt)
W74-11350

SPECTROCHEMICAL METHOD FOR THE DETERMINATION OF 36 ELEMENTS IN INDUSTRIAL EFFLUENT,
Engelhard Industries, East Newark, N.J. Instrumental Analysis Lab.
V. M. LeRoy, and A. J. Lincoln.
Analytical Chemistry, Vol 46, No 3, p 369-373, March, 1974. 6 tab, 1 fig, 20 ref.

Descriptors: *Trace elements, *Analytical techniques, *Spectroscopy, *Industrial wastes, Chemistry, Pollutants, Sampling, Standards, Testing procedures, Iron, Tin, Nickel, Manganese, Chromium, Copper, Zinc, Aluminum, Silver, Gold, Molybdenum, Lead, Cadmium, Calcium, Magnesium, Mercury, Cobalt, *Pollutant identification.

A quantitative spectrochemical method is described for the determination of 36 elements in industrial effluent with limits of element sensitivities for the analytical curves in the 0.0005-0.1 mg/100 ml range. One set of analytical curves was used for all samples. The samples were weighed salt residues obtained through evaporation to dryness at 120C. Any sample volume can be used. Matrix effects were significantly reduced by combining total energy burns in an argon-oxygen atmosphere with 1:6 salt to high purity graphite powder dilutions. Germanium dioxide, added to the graphite powder was the internal standard. Conditions of analysis, salt weight ratios, preparation of standards, precision, and accuracy are discussed. (Jernigan-Vanderbilt)
W74-11351

THE VANADIUM AND SELECTED METAL CONTENTS OF SOME ASCIDIANS,
California Univ., Davis. Dept. of Chemistry.
J. H. Swinehart, W. R. Biggs, D. J. Halko, and N. C. Schroeder.
Biological Bulletin, Vol 46, p 302-312, April, 1974. 2 fig, 1 tab. ACS(PRF-6686-AC3).

Descriptors: *Heavy metals, *Aquatic life, *Seawater, Analytical techniques, Spectroscopy, Testing procedures, Iron, *California, Pollutant identification.
Identifiers: *Vanadium, *Ascidians.

The vanadium and other selected transition metal contents of ascidians primarily from the northern California coast are reported. It has been suggested that the ability to concentrate vanadium to levels greater than the combined levels of other transition metals is confined to certain families in the order Phlebobranchia, but several workers have reported finding substantial concentrations of vanadium in species from the order Aplousobranchia. Studies were carried out on certain species of these orders to determine vanadium content. Observations were made on a species from the order of Stolidobranchia to determine iron content. The species Ascidia ceratodes and Perophora annectens had large vanadium contents as has been predicted for members of the families Ascidiidae and Perophoridae from the order Phlebobranchia. Several species in the order Aplousobranchia have large vanadium contents: the vanadium being present as vanadium (IV) whereas it is vanadium (III) that is found in order Phlebobranchia. Molgula manhattensis, a species from the order Stolidobranchia, shows a large iron content: the metal being localized in the fluid from the heart. Three dominant fractions were chromatographed from the cells contained in the fluid of Ascidia ceratodes. The spectra of these fractions were correlated with the spectrum of the cells. (Jernigan-Vanderbilt)
W74-11353

TRACE METAL ANALYSIS IN WATER BY PROTON-INDUCED X-RAY EMISSION ANALYSIS OF ION-EXCHANGE MEMBRANES,
Duke Univ., Durham, N.C. Paul M. Gross Chemical Lab.
C. H. Lochmuller, J. W. Galbraith, and R. L. Walter.
Analytical Chemistry, Vol 46, No 3, p 440-442, March, 1974. 6 fig, 1 tab, 11 ref.

Descriptors: *Trace elements, *Analytical techniques, *Sampling, Water, X-rays, Ion-exchange, Spectroscopy, Testing procedures, Lead, Mercury, Cadmium, *Pollutant identification.
Identifiers: *X-ray emission analysis.

A simple technique has been developed which provides a rapid, semiquantitative screening method for most metals found in water systems without laborious and exacting preconcentration and chemical techniques. The method involves the use of proton-induced X-ray emission analysis. A target to be analyzed is placed in the path of a beam of protons produced by an accelerator. The atoms of the target are thus excited and emit characteristic X-rays which are captured by a solid state detector. A pulse-height analyzer is used to count the X-rays and an energy spectrum is obtained. Advantages over conventional X-ray fluorescence spectroscopy include lack of interference from bremsstrahlung or 'white radiation' and larger X-ray production cross section. Metals are absorbed by an ion exchange membrane, saving time ordinarily needed to evaporate large volume samples. Prepared solutions, tap water, river water and milk were tested. (Jernigan-Vanderbilt)
W74-11355

DETERMINATION OF TOTAL MERCURY IN AIR BY CHARCOAL ADSORPTION AND ULTRAVIOLET SPECTROPHOTOMETRY,
National Environmental Research Center, Research Triangle Park, N.C. Quality Assurance and Environmental Monitoring Lab.
F. P. Scaringelli, J. C. Puzak, B. I. Bennett, and R. L. Denny.
Analytical Chemistry, Vol 46, No 2, p 278-283, February, 1974. 8 fig, 5 tab, 18 ref.

Descriptors: *Mercury, *Air pollution, *Analytical techniques, Spectroscopy, Sampling, Silver, Inorganic compounds, Activated carbon, *Spectrophotometry, *Pollutant identification.

A simple inexpensive method is described for determining concentrations of total mercury in the atmosphere. Mercury and its compounds were effectively collected by passing ambient air through activated charcoal contained in Vycor tubes. The charcoal tubes were prepared by heating under nitrogen to activate the charcoal and to remove impurities. Immediately after cleaning, the tubes were sealed with ball joints until ready for sample collection to prevent contamination. After sampling, the tubes were resealed for transport to the laboratory where they became an integral part of the analytical gas train. The mercury and its compounds were vaporized by heating under a stream of nitrogen and carried to a thermal reactor, which converted the compounds to the elemental state. Elemental mercury then amalgamated on silver, allowing potential interferences to pass through the absorption cell. The silver amalgam was heated to 300C to give absorption peaks in the ultraviolet at 253.7 nm that were sharp and reproducible. The method was tested with simulated and real atmospheres under field conditions. Precision and accuracy of the method was greater than 95% within the range of 0.15 to 1.5 micrograms/cu m. Outside this range, the error would be greater; however, the dynamic range may be shifted upward or downward by changing sampling rates, sample times, or cell path and by combination of these variables. (Jernigan-Vanderbilt)
W74-11363

APPLICATION OF CHELATING ION EXCHANGE RESINS FOR TRACE ELEMENT ANALYSIS OF GEOLOGICAL SAMPLES USING X-RAY FLUORESCENCE,
Georgia Univ., Athens. Dept. of Geology.
C. W. Blount, D. E. Leyden, T. L. Thomas, and S. M. Guill.
Analytical Chemistry, Vol 45, No 7, p 1045-1050, June, 1973. 2 fig, 3 tab, 20 ref. NSF GP-24311.

Descriptors: *Trace elements, *Resins, *X-ray fluorescence, *Separation techniques, Analytical techniques, *Chelation, *Ion exchange, *Pollutant identification.

The use of chelating ion exchange resins for the quantitative batch extraction of ions of trace elements and as a matrix for the determination of the elements using X-ray fluorescence is described. Chelex-100, an ion exchange resin containing iminodiacetic acid functional groups, was used for the determination of cobalt and nickel in U.S. Geological Survey samples. The selective extraction of bismuth was achieved by pH control, and bismuth was determined in several geochemical standard samples, NMRR, a chelating resin highly selective for gold and platinum metals, was used for the specific extraction of gold. In all cases, the determination was performed by pressing the resin into pellets and using these pellets as samples for X-ray fluorescence. Samples containing as little as 0.04 ppm gold, 0.2 ppm bismuth, and 15 ppm cobalt or nickel were analyzed. (Jernigan-Vanderbilt)
W74-11364

SOLVENT EXTRACTION FOR THE SEPARATION OF METALS,
Rutgers The State Univ., New Brunswick, N. J.
S. A. Katz.
American Laboratory, p 19, 10, 22, 23, October, 1972. 1 tab, 19 ref.

Descriptors: *Separation techniques, *Solvent extractions, *Analytical techniques, *Trace elements, Heavy metals, Testing procedures, Aqueous solutions, Thermodynamics, *Pollutant identification.
Identifiers: Metal ions.

Solvent extraction provides a rapid and conventional approach to the separation and isolation of metal ions from complex mixtures. Prior to separation and subsequent quantitative determinations, the sample containing the metal ions is most frequently encountered as an aqueous solution, therefore, it should be understood that solvent extraction implies the presence of an aqueous solvent/organic solvent pair. In extraction systems, some or all of the water molecules coordinated to the metal ion must be removed before it is possible to obtain a species that can be extracted into an organic solvent. There appear to be three aspects common to all extraction procedures: (1) the formation of an extractable species, (2) the distribution of the extractable species between the initial aqueous phase and the extracting organic phase, and (3) interactions of the extracted species in the organic phase. The formation of an uncharged species is probably a prerequisite for the extraction of metal ions into organic solvents. Such species may be formed by metal-containing ions through coordination. In addition, an uncharged, extractable species may be achieved through the neutralization of a charge. (Jernigan-Vanderbilt)
W74-11365

THE DETERMINATION OF TRACE QUANTITIES OF MOLYBDENUM BY ATOMIC ABSORPTION SPECTROSCOPY,
National Physical Research Lab., Pretoria (South Africa).
L. R. P. Butler, and P. M. Mathews.
Analytica Chimica Acta, Vol 36, p 319-327, 1966. 3 fig, 8 tab, 10 ref.

Descriptors: *Molybdenum, *Spectroscopy, *Analytical techniques, Testing procedures, Laboratory tests, Trace elements, Springs, Rivers, *Pollutant identification.
Identifiers: *Atomic absorption spectroscopy.

A procedure is described for the determination of trace quantities of molybdenum by atomic absorption spectroscopy. Molybdenum was complexed with ammonium pyrollidine dithiocarbamate or 8-hydroxyquinoline and extracted into n-amylmethyl ketone. Molybdenum was then determined by atomic absorption spectroscopy. Interferences were eliminated and detection limits of 0.002ppm for water samples, 0.1ppm for samples of dried plant material, and 1.0ppm for silicate rock samples were obtained. The limit of detection for both the dried plant material and the rock samples could have been improved by increasing the initial weight sample. The methods developed appear to be satisfactory from the point of view of accuracy and precision. Although the chemical steps are time-consuming, many samples can be analyzed daily. The method appears to be at least as rapid and accurate as any other method in use. (Jernigan-Vanderbilt)
W74-11371

INSTRUMENTAL NEUTRON ACTIVATION ANALYSIS OF LEAD MATRICES FOR MERCURY,
California Univ., Irvine.
V. P. Guinn, and K. Heydorn.
Transactions of the American Nuclear Society, Vol 15, p 70, 1972. 2 ref.

Descriptors: *Mercury, *Lead, *Neutron activation analysis, Analytical techniques, Pollutant identification.
Identifiers: *Interferences.

When specimens of various kinds of materials are analyzed for mercury by neutron activation analysis, for all but extremely long irradiations, the sensitivity attainable via the Hg 197-induced activity is appreciably better than that attainable via the Hg 203-induced activity. Because of the low energies of the Hg 197 emissions, workers using NaI (T1) gamma-ray spectrometry have usually preferred to utilize the higher energy gamma-ray (279.1 KeV) of Hg 203. Now, with the wide availability of large high-resolution Ge(Li)detectors, it is generaliy preferable to measure the Hg 197 activity instead. Use of the Hg 203 activity in the analysis of lead-rich matrices can lead to erroneous results due to the emission of photons of the same energy by Pb 203 and by Hg 203. An example of misidentification is the case of measuring the mercury content in automobile exhaust solids when it was apparently actually lead that was being measured. The difference in half lives of Pb 203 and Hg 203 activity allows differentiation of the elements even with an NaI (T1) detector. (Jernigan-Vanderbilt)
W74-11373

ION-EXCHANGE PAPER CHROMATOGRAPHY OF METAL IONS WITH MIXED AQUEOUS-ORGANIC SOLVENTS CONTAINING MINERAL ACID AND A SELECTIVE EXTRACTANT,
Lafayette Coll., Easton, Pa. Dept. of Chemistry.
J. Sherma, and F. J. VanLenten.
Separation Science, Vol 6, No 2, p 199-206, April, 1971. 17 ref.

Descriptors: *Chromatography, *Ion exchange, Aqueous solutions, *Metals, *Solvent extractions, Analytical techniques, Separation techniques, Chemical reactions, Organic compounds, Scandium, Nickel, Cations, Anions, Laboratory tests, *Pollutant identification.
Identifiers: *Metal ions.

An ion exchange chromatography method has been used for numerous useful separations. The results of ion-exchange with papers are often the same as those achieved with column systems employing the same mobile phase and a similar resin. Mixed solvents containing an organic extractant provide selective separations of metal ions on cation-and anion-exchange papers. The separations of scandium, hafnium plus zirconium, nickel and thorium from complex mixtures has been demonstrated. Various separations in dithizone and dimethyl sulfoxide media are also reported. As a general rule, ions with very high distribution coefficients (greater than 1000) will remain at the origin during paper chromatography, while ions with coefficients below 1 will migrate. (Jerome-Vanderbilt)
W74-11374

LEAD-POISONING DETECTOR.
HSMHA Health Reports, Vol 86, No 7, p 652, July, 1971. 1 photo.

Descriptors: *Lead, *Analytical techniques, *Public health, *Instrumentation, Pollutants, Metals, Enzymes, Testing procedures, Toxins, On-site data collections, *Pollutant identification.

An ultra-sensitive, portable instrument for detecting lead poisoning in people, called the microporph, has been developed. The portable unit can be operated on house current by personnel with minimum training and requires only 30-40 microliters of blood for analysis. The test is for protoporphyrin rather than lead itself. The instrument can easily handle two tests per minute and is sufficiently sensitive to detect normal as well as abnormal protoporphyrin levels in the blood. Thus, any degree of lead poisoning may be detected. (Jerome-Vanderbilt)
W74-11377

MERCURY DETERMINATIONS IN NATURAL WATERS BY PERSULFATE OXIDATION,
Georgia Univ., Athens. Dept. of Zoology.
J. J. Alberts, J. F. Schindler, R. W. Miller, and P. W. Carr.
Analytical Chemistry, Vol 46, No 3, p 434-437, March, 1974. 3 fig, 2 tab, 9 ref.

Descriptors: *Mercury, *Aqueous solutions, *Analytical procedures, *Reduction(Chemical), Oxidation, Organic compounds, Testing procedures, Instrumentation, Sampling, *Pollutant identification, Sampling.
Identifiers: Sample preparation, *Atomic absorption spectroscopy.

A procedure is described for determining mercury at the parts-per-billion (ppb) level in aqueous solution which uses an open analysis system, requires small sample volume, is easily handled in the field and during transportation, has little loss of mercury during storage, allows oxidation at elevated temperatures, has improved analysis time, and ensures that the sample is sealed until opened in the analysis system, thereby releasing all of the mercury present as the metallic vapor. The method is an adaptation of the Menzel and Vaccaro ampoule method for determination of dissolved organic matter in natural waters, involving the oxidation of organic matter by persulfate in an ampoule sealed under nitrogen and heated to 120C. (Jernigan-Vanderbilt)
W74-11378

MERCURY CONTENT IN FEATHERS OF SWEDISH BIRDS FROM THE PAST 100 YEARS,
Museum of Natural History, Stockholm (Sweden).
W. Berg, A. Johnels, B. Sjostrand, and T. Westermark.
Oikos, Vol 17, No 1, p 71-83, 1966, 12 fig, 12 tab, 17 ref.

Descriptors: *Path of pollutants, *Birds, *Mercury, *Food chain, Water pollution, Pollutants, Temporal distribution, Analytical techniques, *Neutron activation analysis, Measurements, Sampling, Data collections, Evaluation, Laboratory tests, *Pollutant identification.

The mercury content in feathers in ten species of birds was determined by activation analysis. Using material drawn from skins and mounted specimens and from living or freshly killed birds, the study covered a period of more than the past hundred years. The possibility of post mortem contamination is discussed and allowances have been made for such cases. Roughly constant Hg levels were encountered in each of the investigated species during the period 1840-1940, although there was considerable variation between species. Differences in position within the food chain seem to account for such differences between species. A well documented increase of Hg concentration, amounting to a least 10 to 20 times the previous level appeared in specimens from the 1940's and 1950's. This appearance of increased mercury accumulations in birds mainly in the early 1940's indicates that alkyl-Hg compounds used as seed dressings were chiefly responsible for the increase. (Jerome-Vanderbilt)
W74-11382

DETERMINATION OF LEAD, URANIUM, THORIUM, AND THALLIUM IN SILICATE GLASS STANDARD MATERIALS BY ISOTOPE DILUTION MASS SPECTROMETRY,
National Bureau of Standards, Washington, D.C. Analytical Chemistry Div.
I. L. Barnes, E. L. Garner, J. W. Gramlich, L. J. Moore, and T. J. Murphy.

Analytical Chemistry, Vol 45, No 6, p 880-885, May, 1973. 1 tab, 4 fig, 11 ref.

Descriptors: *Mass spectrometry, Isotope studies, *Lead, Analytical techniques, *Silicates, Standards, Materials testing, *Pollutant identification.
Identifiers: *Thorium, *Thallium, *Uranium.

One of the first materials to be selected for standard materials for trace element analysis was a silicate matrix containing many elements at a series of graded concentration levels. These were prepared by the Corning Glass Works. A set of four standard glass wafers were prepared which had been doped with 61 different elements at the 500, 50, 1, and 0.02ppm level. The concentrations of lead, uranium, thorium, and thallium were determined by isotope dilution mass spectrometry at a number of points in each of the glasses. The results obtained from independent determinations in two laboratories demonstrated the homegeneity of the samples and that precision of the order of 0.5% (95% L.E.) may be obtained by the method even at the 20ppb level, for these elements. The chemical and mass spectrometric procedures are presented. (Jernigan-Vanderbilt)
W74-11385

DETERMINATION OF SUBMICROGRAM AMOUNTS OF MERCURY BY THE OXYGEN BOMB COMBUSTION METHOD,
National Environmental Research Center, Las Vegas, Nev.
E. W. Bretthauer, A. A. Moghissi, S. S. Snyder, and N. W. Mathews.
Analytical Chemistry, Vol 46, No 3, p 445-446, March 1974. 2 tab, 4 fig.

Descriptors: *Mercury, *Analytical techniques, *Burning, Tracers, Inorganic compounds, Organic compounds, Spectrocopy, Testing procedures, Instrumentation, Organic matter, Radioisotopes, *Pollutant identification.
Identifiers: *Methylmercury, Sample preparation, *Atomic absorption spectroscopy.

Using flameless atomic absorption, oxidation of the sample containing inorganic and/or organic mercury was conducted in an oxygen-filled bomb. Using this technique and utilizing a radiotracer of mercury to quantitate any losses during the oxidation, an accurate method was developed to determine environmental levels of mercury in combustible samples. The method was tested by determining the recovery of both stable and radioactive mercury, added in either an organic or inorganic form from vegetation samples. Mercuric chloride and organic mercury were added to alfalfa samples, resulting in recoveries from 78 to 90%. If the amount of organic mercury is desired distinct from the total mercury content, a separation of organic from inorganic fractions should be performed before combustion in the bomb. (Jernigan-Vanderbilt University)
W74-11388

TRACE DETERMINATION OF BERYLLIUM OXIDE IN BIOLOGICAL SAMPLES BY ELECTRON-CAPTURE GAS CHROMATOGRAPHY,
Aerospace Medical Research Lab., Wright-Patterson AFB, Ohio.
G. M. Frame, R. E. Ford, W. G. Scribner, and T. Ctvrtnicek.
Analytical Chemistry, Vol 46, No 4, p 534-539, April, 1974. 4 tab, 14 ref.

Descriptors: *Beryllium, *Oxides, *Organic matter, *Gas chromatography, Analytical techniques, Laboratory tests, Testing procedures, Animal physiology, Rodents, Mammals, Pollutant identification.

Two preparations of beryllium oxide labeled with Be7 were synthesized by calcining at 500 or 1600C. Comparative radiochemical and gas chromatographic analyses of these oxides were made using two procedures. Direct dissolution-chelation of the oxides with concentrated trifluoroacetylacetone in ampoules followed by electron-capture gas chromatography of the resultant beryllium chelate suffered from interference by a trifluoroacetylacetone reaction product. A second method employed the dissolution of the oxides in dog blood and rat liver homogenate media by a hot 75% sodium hydroxide procedure. The beryllium from the dissolved oxide was then chelated by a low temperature reaction with trifluoroacetylacetone without forming an interfering product. Subsequent gas chromatographic analysis yielded recoveries averaging 105%; standard deviation= plus or minus 7%. The samples tested were limited to the 1.0mg Be0/ml level by radioactivity, but the gas chromatographic base-line noise level was now enough to permit analyses of submicrogram quantities. (Jernigan-Vanderbilt)
W74-11389

ANALYSIS OF ORGANIC MERCURY COMPOUNDS BY GAS CHROMATOGRAPHY,
Kobe Univ. (Japan). Dept. of Public Health.
K. Sumino.
Kobe Journal of Medical Science, Vol 14, p 115-148, June, 1968, 12 fig, 14 tab, 19 ref.

Descriptors: *Mercury, *Analytical techniques, *Gas chromatography, *Separation techniques, *Water pollution sources, Metals, Heavy metals, Pesticides, Human pathology, Calibrations, *Pollutant identification.
Identifiers: *Extraction, *Isolation, *Methylmercury.

Ultratrace determinations of alkyl and phenyl mercury using a gas chromatograph with an electron capture detector have been performed. A detection limit for methyl mercury chloride of 10 to the-12 th power and for phenyl mercury chloride of 10 to the -11th power was reached. Isolation of organic mercury from different materials was performed by separation of organic mercury combined with SH radical into 1N-HC1 solution. The solution was then extracted with benzene, and this benzene solution re-extracted with aqueous glutathione. After acidification of the resulting solution with HC1, final extraction with benzene was performed. This cleanup method was employed in the identification of organic mercury and was a very useful technique for its extraction. Materials related to Minamata Disease were analyzed and found to contain high concentrations of methylmercury. An attempt to trace Minamata Disease in Niigata Prefecture led to the following conclusions: (1) Methylmercury was detected in water moss only in the area around a drainage outlet of an acetaldehyde factor; (2) Methylmercury is a by-product in acetaldehyde production; (3) Waste discharge from the factory caused Minamata Disease in experimental animals. (Oleszkiewicz-Vanderbilt)
W74-11390

DESIGN AND EVALUATION OF A VIDICON SCANNING SPECTROMETER FOR MOLECULAR ABSORPTION AND ATOMIC EMISSION SPECTROMETRY,
Purdue Univ., Lafayette, Ind. Dept. of Chemistry.
M. J. Milano, H. L. Pardue, T. E. Cook, R. E. Santini, and D. W. Margerum.
Analytical Chemistry, Vol 46, No 3, p 374-381, March, 1974 8 fig, 2 tab, 13 ref. AFOSR(71-1588) and PHS(GM 13326-07).

Descriptors: *Measurement, *Spectroscopy, *Analytical techniques, *Instrumentation, *Metals, Testing procedures, Calcium, Iron, Copper, Salts, *Pollutant identification.
Identifiers: *Atomic absorption spectroscopy.

A silicon target vidicon tube is used for scanning spectrometry in the visible region at speeds ranging from less than 0.1Hz up to 250Hz. The spectrometer is interfaced to a digital computer for on-line collection and processing of data. Dynamic range data taken over four orders of magnitude yield a gamma function of 0.998 plus or minus 0.005 for the tube. Quantitative data are reported for kinetic studies using molecular absorption spectrometry and simultaneous multielement analyses in synthetic solutions using flame emission spectrometry. Chemical data included demonstrate that absorbance data are reliable to at least 0.002 absorbance unit at a scan rate of 250Hz. Flame emission data are linear between 0.25 and 10ppm for sodium, potassium and lithium and between 1 and 100ppm for calcium. Standard deviations for repetitive runs on the alkali metals range from a low of 0.01ppm for 0.25ppm lithium to a high of 0.12ppm for 10ppm sodium. (Jernigan-Vanderbilt)
W74-11394

FILTER PORE-SIZE EFFECTS ON THE ANALYSIS OF AL, FE, MN, AND TI IN WATER,
Geological Survey, Menlo Park, Calif.
V. C. Kennedy, and G. W. Zellweger.
Water Resources Research, Vol 10, No 4, p 785-790, August 1974. 1 fig, 2 tab, 24 ref.

Descriptors: *Water analysis, *Filtration, *Clay minerals, *Analytical techniques, Separation techniques, Spectroscopy, *Aluminum, *Iron, *Titanium, *Manganese, Adsorption, Particle size, Clays, Pollutant identification.

Fine-grained particulate material can pass through 0.45-micrometer membrane filters and cause large percentage errors in analyses of those elements that are enriched in the particulates and have a very low concentration in solution in natural waters; Al, Fe, Ti, and, to a lesser extent, Mn are examples. Hence in making thermodynamic equilibrium calculations for these elements, considerable caution is necessary in using analyses from water samples passed through filters with pore sizes larger than 0.1 micrometer. Compared with 0.45 micrometer filters the 0.1 micrometer filters significantly reduce passage of particulates without increasing filtration time to an unreasonable degree. If the common procedure of filtration through a membrane filter followed by acidification is used, the concentration of dissolved Al, Fe, and Mn determined in the filtrate will vary with the degree of filter clogging, pH after acidification, and the time of standing before analysis. When a spectrographic analysis of a water residue, which can be quite sensitive for Ti, is made, the presence of Ti concentrations significantly exceeding 1 microgram per liter should be a warning that clay minerals may have passed through the filter. (Knapp-USGS)
W74-11421

COMPARISON OF OBSERVED AND CALCULATED CONCENTRATIONS OF DISSOLVED AL AND FE IN STREAM WATER,
Geological Survey, Reston, Va.
B. F. Jones, V. C. Kennedy, and G. W. Zellweger.
Water Resources Research, Vol 10, No 4, p 791-793, August 1974. 3 tab, 26 ref.

Descriptors: *Water chemistry, *Water analysis, *Chelation, *Organic matter, *California, Analytical techniques, Aluminum, Iron, Mineralogy, Equilibrium, Leaching, Weathering, *Pollutant identification.

Measured concentrations of dissolved Al and Fe in streamflow samples treated to avoid particulate contamination can compare favorably with concentrations calculated from data on mineral stability and inorganic complexing. Significant differences are probably related to storm runoff or organic complexing. Waters from several northern California streams, analyzed in conjunction with special techniques to exclude particulate contamination, contained dissolved Al and Fe in the ranges 1-3 and 0.3-8.8 micrograms/l respectively,

for samples collected during low-flow periods. A moderate flow sample from the Mattole River, in an area of 90-100in of rainfall per year, gave an Al concentration of 10 micrograms/l and an Fe concentration of about 0.3 microgram/l. Comparison of these concentrations for dissolved Al and Fe with those calculated from stability constants for common mineral phases with provision for inorganic complexing shows them to be generally in reasonable agreement. Higher than expected values of Al were associated with storm runoff, and abnormally high Fe was found in streams with highly organic sediment. (Knapp-USGS)
W74-11422

DETERMINATION OF TRACE METALS IN SODIUM DITHIONITE-CITRATE EXTRACTS OF SOILS AND SEDIMENTS BY ATOMIC ABSORPTION,
Geological Survey, Menlo Park, Calif. Water Resources Div.
E. A. Jenne, J. W. Ball, and C. Simpson.
Journal of Environmental Quality, Vol 3, No 3, p 281-287, July-September 1974. 2 fig, 4 tab, 32 ref.

Descriptors: *Trace elements, *Soils, *Sediments, *Chemical analysis, *Flame photometry, Solvent extractions, Analytical techniques, Cobalt, Copper, Nickel, Molybdenum, Zinc, Iron, Trace elements, *Pollutant identification.
Identifiers: *Atomic absorption photometry.

A general method was developed for the analysis of Co, Cu, Ni, Mo, and Zn in dithionite-citrate extracts of soils and sediments. Because of the high Zn content of dithionite, it is necessary to preclean the dithionite-citrate solution before it is used to extract soils or sediments. This precleaning lowers the detection level significantly for other trace elements as well. Since Fe causes flame interferences in atomic absorption, the size of the individual sample aliquot taken to chelation-solvent concentration is varied to provide a constant quantity of Fe (5ng). The standards and blanks are adjusted to the same Fe content. This approach is necessitated by the wide differences in the Fe concentrations of the dithionite-citrate extracts. Following pH adjustments and addition of ammonium-1-pyrrolidine dithiocarbamate, the trace metals (and Fe) are concentrated via two successive 10ml methyl isobutyl ketone extractions. Quantities of Fe much greater than 5ng interfere in the solvent concentration step. Natural organics released by the dissolution of free-Fe and -Mn oxides, to the extent that they are represented by fulvic acids, do not cause any significant interference. (Knapp-USGS)
W74-11425

A STUDY OF OIL SOURCE IDENTIFICATION TECHNIQUES,
Coast Guard, Washington, D.C. Office of Research and Development.
L. Melamed.
Available from NTIS, Springfield, Va., 22161 as AD-761 971, Price $4.50 printed copy; $2.25 microfiche. Environmental and Transportation Technology Division Report, September 1972. 59 p, 7 fig, 1 tab, 25 ref, append.

Descriptors: *Oil pollution, *Oil spills, *Pollutant identification, Path of pollutants, Tracking techniques, Tagging, Marking techniques, Tracers.

Techniques for the identification of the sources of oil slicks include both passive (fingerprint) and active tagging. Passive techniques are easy to implement but offer a fragile forensic foundation; conversely, active techniques can provide excellent courtroom evidence but are beset by problems of system implementation. Active tagging is recommended for research. Organic phosphors and halogenated polycyclic aromatics are possible tags for field use. (Knapp-USGS)
W74-11435

THE DETERMINATION OF MERCURY IN COMMERCIALLY IMPORTANT AQUATIC ORGANISMS,
Omni Research, Inc., Mayaguez, Puerto Rico. Caribbean Research Labs.
R. Y. Ting.
Available from NTIS, Springfield, Va., 22161 as COM-73-11125, Price $4.25 printed copy; $2.25 microfiche. Project Completion Report to NOAA, National Marine Fisheries Service, October 1972. 43 p, 1 fig, 3 tab, 5 ref.

Descriptors: *Mercury, *Fish, *Puerto Rico, Heavy metals, Poisons, Trace elements, Public health, *Pollutant identification.

Mercury in the flesh of the majority of fish and invertebrates commonly taken for consumption in Puerto Rico was below the maximum permissible level set by FDA (0.5ppm). However, the flesh of larger pelagic carnivorous fish including barracuda, blue marlin, and kingfish often exceeded the 0.5ppm level. Herbivorous fish, in general, contain less mercury than carnivorous fish of comparable weight. (Knapp-USGS)
W74-11438

MONITORING TOXAPHENE CONTAMINATION IN A GEORGIA ESTUARY,
Georgia Univ., Sapelo Island. Marine Inst.
For primary bibliographic entry see Field 5B.
W74-11443

5B. Sources Of Pollution

LOCALIZED THERMAL POLLUTION IN SHALLOW STREAMS, (NEAR-FIELD TEMPERATURE DISTRIBUTIONS),
Kansas Univ., Lawrence. Water Resources Research Inst.
Y-S. Yu.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 632, $3.75 in paper copy, $2.25 in microfiche. Contribution No 133, September 1973. 53 p, 18 fig, 3 tab, 6 ref. OWRR A-040-KAN(1). 14-31-0001-3516.

Descriptors: *Thermal pollution, *Heated water, *Temperature distribution, Velocity, Water temperature, Dilution, Heat flow, Distribution patterns.
Identifiers: *Dilution factor, *Heat flow ratio, Shallow streams, *Thermal plumes, Heated discharge.

Temperature rise in the near field of a heated discharge into a relatively wide and shallow stream has been determined in a laboratory channel. The experimental results show that the region in which the maximum temperature rise in each section of the stream exceeds 5 degrees F, is limited to a distance no larger than 32 bo (bo = width of channel for the heated discharge) downstream from the entry of heated water. The maximum width of the thermal plume in this critical region is less than four-fifths of the width of the stream flow. The maximum temperature rise near the water surface decays linearly with the distance measured along the stream on a log-log plot. An empirical equation for the position of the axis of the thermal plume is obtained. The width of spread measured from the axis to the stream-side boundary of the thermal plume is proportional to the distance. The dilution factor and heat flow ratio at four different sections in the thermal plume have also been determined. The maximum heat loss in this region is less than 8% of the original heat flow in the heated water. The effects of the five key dimensionless parameters, namely, U/V, Th/Ta, Fo, dh/bo, and a on the dilution factor are discussed. The presence of a weir at the entry of the heated discharge results in an extended region of temperature inversion due to the spreading of heated water along the channel bottom. The results of this study can be used as a first approximation to estimate the size of thermal plume and the decay of maximum temperature rise in the near field in relatively shallow and wide stream.
W74-10902

AGRICULTURAL WASTE WATER ACCOMMODATION AND UTILIZATION BY VARIOUS FORAGES,
Maryland Univ., College Park. Dept. of Agronomy.
For primary bibliographic entry see Field 5D.
W74-10903

WATER-BORNE TRANSMISSION OF CHLORAMPHENICOL-RESISTANT SALMONELLA TYPHI IN MEXICO,
Institute of Health and Tropical Diseases, Mexico City. Epidemiology Unit.
For primary bibliographic entry see Field 5C.
W74-10906

THE EFFECT OF HYDROMETEOROLOGICAL CONDITIONS ON THE ZETA-POTENTIAL OF SUSPENDED SOLIDS (HIDROMETEOROLOGIAI VISZONYOK HATASA A LEBEGO ANYAGOK ZETA-POTENCIALJARA),
L. Bulkai, I. Licsko, and L. Szepkuti.
Hidrologiai Kozlony, No 12, p 557-565, 1973. 6 fig, 4 tab, 2 ref. English summary.

Descriptors: *Zeta potential, *Suspended solids, Rivers, *Hydrometeorology, Electric properties, Conductivity, Water level, Seasonal, Temperature, Algae.
Identifiers: *Danube River, Electrostatic charges, River stages.

The effect of hydrometeorological conditions on the zeta potential of suspended solids was investigated in the Danube River. The colloidal particles had a negative charge and almost every particle within a sample had a different zeta potential. Therefore, it was impossible to describe a particular hydrometeorological situation positively and unambiguously by a single zeta potential value. An attempt was subsequently made to describe the electrostatic charges of the colloidal particles present by the distribution of the zeta potential values observed. The observation data were processed with the help of a computer, but there was no correlation between either the suspended solids content and zeta potential or between conductivity and zeta potential. There was a relationship of limited validity between the number of algae counted in unit volume and the value of the zeta potential. At an increasing alga count the zeta potential tended to zero, whereas decreasing counts were accompanied by increasing zeta potential values. A relationship of similarly limited, but more general validity was found to exist between river stage and the zeta potential. (Merritt-FIRL)
W74-10907

NOTE ON LITHIUM IN SALINE GROUNDWATERS,
Central Soil Salinity Research Inst., Karnal (India).
I. C. Gupta.
Indian J Agric Sci. Vol 42, No 7, p 650-651. 1972.
Identifiers: *Electrical conductivity, Groundwater, Irrigation, *Lithium, *Saline groundwater, Toxicity, *India(Uttar Pradesh).

Ground water samples from Mathura, Uttar Pradesh, India, were analyzed for Li. The irrigation waters were classified on the basis of electrical conductivity (micromhos/cm at 25 degrees C) as C1 (0-250); C2(250-750); C3 (750-2250); C4 (2250-4000); C5 (4000-6000) and C6 (> 6000). Out of 35 samples 6 belonged to C3 class, 3 to C4 class, 9 to C5 and the rest to C6 class. All waters contained Li, the lowest concentration being 0.02 ppm

and the highest, 1.35 ppm. The waters of C3 and C4 class contained Li in safe limit (0.05 ppm or less). The average Li content of C5 class waters was 0.06 ppm, which is higher than permissible concentrations. In waters of class C6 the average Li content was 0.35 ppm, considered to be very toxic. Ground waters of high salinity contain higher concentrations of Li. The waters with electrical conductivity of 4000 micromhos/cm at 25 degrees C or less are less susceptible to toxic concentrations of Li; waters of C6 may contain Li in amounts that may be toxic to crops.--Copyright 1973, Biological Abstracts, Inc.
W74-10908

THE PRINCIPLES OF SUBSTANTIATING PERMISSIBLE CONCENTRATIONS OF RADIOACTIVE SUBSTANCES IN FRESHWATER BODIES (PRINTSIPY OBOSNOVANIYA DOPUSTIMYKH KONTSENTRATSIY RADIOAKTIVNYKH VESHCHESTV V VODE PRESNOVODNYKH VODOYEMOV),
For primary bibliographic entry see Field 5G.
W74-10912

INTERACTION OF TEMPERATURE AND MOISTURE ON IRON AND MANGANESE AVAILABILITY IN SOILS,
Quebec Ministere de l'Agriculture et de la Colonisation. Div. of Soils.
For primary bibliographic entry see Field 2G.
W74-10913

EFFECT OF NITROGEN AND PHOSPHORUS AT TWO MOISTURE LEVELS ON THE STATUS OF THE AVAILABLE ZN, CU, MN AND FE IN THE SOIL,
Punjab Agricultural Univ., Ludhiana (India). Dept. of Soils.
G. Dev, and M. S. Mann.
J Res Punjab Agric Univ. Vol 9, No 2, p 277-281. 1972.
Identifiers: Ammonium sulfate, Copper, Iron, Manganese, *Nitrogen, *Phosphorus, *Soil moisture, Zinc, Hydrogen ion concentration, Loam, *Metals.

Incubation studies in the laboratory were conducted on a loamy-sand soil to study the effect of 3 levels of N (0, 200 and 400 kg N/ha) and 3 levels of P (0, 100 and 200 kg P2O5/ha) alone and in combination at 2 moisture levels (30 and 60% of the saturation percentage). Increasing doses of N, as (NH4)2SO4, decreased the soil pH and increased the status of available Zn and Mn significantly. Increase in the level of P application significantly decreased the status of available Zn and Fe. There was no significant effect of moisture levels, neither was there any significant interaction between any of the 3 factors tested.--Copyright 1973, Biological Abstracts, Inc.
W74-10918

METHODS FOR THE DIRECT DETERMINATION OF HEAVY-METAL POLLUTANTS IN THE ENVIRONMENT,
Louisiana State Univ., Baton Rouge.
For primary bibliographic entry see Field 5A.
W74-10923

METHYLATION OF MERCURY IN LAKE AND RIVER SEDIMENTS DURING FIELD AND LABORATORY INVESTIGATIONS,
Wisconsin Univ., Madison.
L. W. Jacobs.
Available from University Microfilms, 300 No. Zeeb Rd., Ann Arbor, Mich., 48106 (Order No. 73-23,067). Ph D Dissertation, 1973. 107 p.

Descriptors: *Mercury, *Methane, Pollution, Rivers, Lakes, Onsite investigation, Anaerobic conditions, Aerobic conditions, Absorption, Ecology, Laboratory tests, Sedimentation, Water pollution sources, *Pollutant identification, Oligotrophy, Eutrophication, Lake sediments.
Identifiers: Methylation, *Methyl-mercury, Aqua regia, Atomic absorption spectrophotometry.

The objectives were to determine the amount of methyl-mercury (MeHg) that is produced in the sediments of two contrasting river environments when these sediments were treated with mercuric or phenylmercuric salts, and to determine the amount of MeHg formed in dissimilar lake and river sediments and the characteristics which affect the production and accumulation of MeHg. On-site experimentation was performed at two river sites by sample retrieval of bulk sediment. These samples were analyzed for total Hg using an aqua regia digest and flameless atomic absorption spectrophotometry. Results indicate that Hg losses from stationary sediments are minimal and that sediment transport is the major source of Hg movement in a river system. In laboratory tests, intact sediments from two lakes, one oligotrophic and one eutrophic, and two polluted rivers were treated with PhHgAc and incubated for up to 14 days under anaerobic or aerobic conditions. The amount of MeHg formed in the four sediments differed and seemed to be related to the amount of sulfide present and the general biological activity of the sediments. Biological pathways producing MeHg and methane did not seem to be directly related. (Prague-FIRL)
W74-10924

SYMPOSIUM ON ENVIRONMENTAL QUALITY MONITORING; SYMPOSIUM ON SOURCES AND EVOLUTION OF THE ATMOSPHERIC AEROSOL; GENERAL PAPERS.
For primary bibliographic entry see Field 5A.
W74-10947

PHOTOCHEMICAL AEROSOL FORMATION IN THE ATMOSPHERE AND IN AN ENVIRONMENTAL CHAMBER,
California State Air Resources Board, El Monte.
R. J. O'Brien, J. R. Holmes, and A. H. Bockian.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 33-38, 1974. 6 fig.

Descriptors: *Aerosols, *Air pollution, *Smog, *California, Laboratory tests, Sampling, Pollutant identification.

During the summer of 1969 a sampling program for atmospheric particulates was initiated in the Los Angeles area. A diurnal variation in total particulate concentrations and light scattering was noted at Downtown Los Angeles, with peaks occurring after the initial direct emissions due to traffic had subsided, and coinciding with the rise of various photochemical phenomena such as oxidant formation. Chamber experiments with hydrocarbons produced copious amounts of aerosol reacted with nitric oxide. Paper and thin-layer chromatograms of atmospheric and synthetic (chamber generated) aerosols were similar, with spots corresponding to monocarboxylic acids, dicarboxylic acids, and acid nitrates common to both. The effectiveness of diolefins in producing light-scattering aerosol may be related to their ability to condense on preexisting particles rather than auto-nucleate when present at lower concentrations. (See also W74-10947) (Knapp-USGS)
W74-10955

VIRAL QUALITY MONITORING IN THE POLLUTED AQUATIC ENVIRONMENT,
Delaware Univ., Newark. Dept. of Chemistry.
M. P. Kraus.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 67-69, 1974.

Descriptors: *Monitoring, *Viruses, *Bioindicators, Algae, Pollutant identification, Water quality, Water pollution sources.

A model host/virus system can provide information on principles and mechanisms of virus transfer in water, so that, when the need arises, specific problems of aquatic virology may be solved. In particular, using such a model, blue-green algal cultures can provide a rapid, economical assay for virus in water. Genetic specificities recognizable by such a host can illustrate mechanisms of interspecies transfer among ecologically-related aquatic organisms. (See also W74-10947) (Knapp-USGS)
W74-10963

THE URBAN PLUME OF ST. LOUIS,
Washington Univ., Saint Louis, Mo. Dept. of Mechanical and Aerospace Engineering.
R. B. Husar, D. L. Blumenthal, J. Anderson, and W. E. Wilson.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974 Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 70-77, 1974, 4 fig.

Descriptors: *Air pollution, *Mapping, *Sampling, *Missouri, Smog, Winds, Meteorology.
Identifiers: *St. Louis(Mo), Urban heat island.

The urban plume of St. Louis, Missouri was mapped by an instrumented single engine aircraft which continuously measured the aerosol light scattering coefficient, total nuclei concentration, CO, SO2, O3, temperature humidity, and turbulence intensity. Under steady NE, 3m/s wind conditions the urban plume, measured at 35 and 50km downstream from downtown was almost gaussian with and confined to a mixing depth of 1000 m. Simultaneous pilot balloon soundings provided the vertical wind velocity profiles. The horizontal optical depth of aerosol plume added by the metropolitan area to the background was 2.5 while the average vertical optical depth was 0.2. Aerosol mass flow was at least 7,500 kg/hr. Under stagnant wind conditions, at night, strong evidence was found for the existence of an urban heat island with induced vertical air flow rising over downtown. In this case the urban plume is directed vertically and spread radially underneath an elevated inversion layer. (See also W74-10947) (Knapp-USGS)
W74-10964

SO2 OXIDATION MECHANISM IN OLEFIN-NOX-SO2 SMOG,
National Environmental Research Center, Research Triangle Park, N.C.
W. E. Wilson, M. C. Dodge, D. N. McNelis, and J. Overton.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 84-87, 1974. 4 fig, 6 ref.

Descriptors: *Smog, *Sulfates, *Air pollution, *Oxidation, Acids, Chemical reactions.
Identifiers: *Sulfuric acid, *Olefins, Ozone, Photochemical smog.

The atmospheric conversion of SO2 to sulfuric acid and various forms of sulfate is an important process in the global sulfur cycle and in urban areas. In the presence of olefinic hydrocarbons, nitrogen oxides, and light a fast indirect photochemical oxidation of SO2 occurs. There are a number of species present in smog which might react with SO2 to yield SO3: OH, HO2, O, O3, and a variety of oxygenated hydrocarbon radicals. The rates of reaction of SO2 with OH, HO2, O, and O3 are too slow to account for the indirect photochemical oxidation of SO2 in olefin-NOx smog. (See also W74-10947) (Knapp-USGS)
W74-10966

DIRECT DETERMINATION OF THE TOTAL ATMOSPHERIC AEROSOL MASS DISTRIBUTION,
Minnesota Univ., Minneapolis.
For primary bibliographic entry see Field 5A.
W74-10967

COMPARISON OF VOLUME AND MASS DISTRIBUTION FOR DENVER AEROSOLS,
National Environmental Research Center, Research Triangle Park, N.C.
J. L. Durham, W. E. Wilson, K. Willeke, and K. T. Whitby.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 95-101, 1974. 2 fig, 4 ref.

Descriptors: *Sampling, *Aerosols, Instrumentation, Air pollution, Dusts, Particle size, *Distribution patterns, Turbidity, *Colorado.
Identifiers: *Denver(Colo).

Airborne particulate matter is sampled by various kinds of impactor-type mass measurement devices. Aerosol dynamics is also studied by measurements with the Minnesota Aerosol Analyzing System (MAAS). From the MAAS data, the volume concentration distribution can be calculated and then compared to mass concentration distribution. The MAAS infers the number distribution through measurements of electrical mobility for submicron particles and optical scattering for particles larger than 0.5 micron, whereas the impactors measure the mass concentration distribution as a function of aerodynamic diameter. Agreement between the measured data is good. The existence of a mode in the coarse particle range above 1 micron is indicated by both systems. A minimum is measured by the MAAS in the range 0.7 to 2.0. In this same size range the impactor's mass concentration decreases from high values for large particles to an approximately constant value for submicron particles. A mode in the submicron range is indicated only by the MAAS measurement. (See also W74-10947) (Knapp-USGS)
W74-10968

MASS AND COMPOSITION OF AN URBAN AEROSOL AS A FUNCTION OF SIZE FOR SEVERAL VISIBILITY LEVELS,
National Environmental Research Center, Research Triangle Park, N.C.
R. K. Patterson, and J. Wagman.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 102-107, 1974. 4 fig, 3 tab.

Descriptors: *Sampling, *Aerosols, Instrumentation, Air pollution, Dusts, Particle size, Distribution patterns, Turbidity, *New Jersey.
Identifiers: Nephelometers.

To determine how variations in aerosol mass, composition, and size distribution accompany variations in visibility in an urban area, an integrating nephelometer was used to monitor visibility and four sets of aerosol samples were taken during different visibility conditions. The sampling site was in Secaucus, New Jersey, approximately three miles west of Manhattan, New York. Samples were collected between September 29 and October 10, 1970. The mass distribution cannot be adequately characterized by a single, log-normal distribution. The mass distribution was fitted to a biomodal distribution and the five parameters defining the two long-normal distributions and the proportion of mass in each were determined. As visibility decreased the amount of mass below 2 microns increased and the MMD of the lower sized mode decreased. Both effects would increase the effective light scattering per unit mass. (See also W74-10947) (Knapp-USGS)
W74-10969

APPLICATION OF ANALYTICAL INSTRUMENTATION TO INDUSTRIAL MONITORING OF AQUEOUS EFFLUENTS,
Union Carbide Corp., South Charleston, W. Va. Dept. of Engineering.
J. W. Sugar, and J. H. Brubaker.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 121-126, 1974.

Descriptors: *Monitoring, *Water pollution control, Industrial wastes, Water analysis, Waste water treatment, Chemical analysis, Analytical techniques, Pollutant identification.

Because of the highly variable chemical composition and hydraulic flow of industrial waste water, it is essential for industrial plants to use instrumentation to characterize pollutant discharges to public waterways. Based on Union Carbide's monitoring experience, a systematic approach to the development of a successful monitoring program is presented. This approach deals with establishing monitoring objectives, initiating a sound laboratory program, implementing on-line monitoring systems, anticipating maintenance and operating problems, determining personnel requirements and utilization of results to achieve maximum program benefits. Various on-line installations are used to illustrate the nature of Carbide's current monitoring program. (See also W74-10947) (Knapp-USGS)
W74-10973

DETERMINATION OF TRACE ORGANIC COMPONENTS IN AQUEOUS WASTES,
Monsanto Co., Saint Louis, Mo.
J. P. Mieure, F. M. Grogan, and M. W. Dietrich.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 127-128, 1974.

Descriptors: *Monitoring, *Water pollution control, *Industrial wastes, Water analysis, Waste water treatment, Chemical analysis, Analytical techniques, *Pollutant identification.

The pollutional significance of a waste water can be assessed only if the individual components in the effluent can be determined down to the levels at which they become environmentally insignificant. Methods that have been found effective for detecting, identifying and measuring many individual organic compounds at these levels in industrial effluents are discussed. These methods can be used to determine if a discharge problem exists, as well as to provide periodic analyses. They can also be used to guide the development of a continuous monitoring system should this be required. Emphasis is placed on methods which use the equipment and apparatus normally found in a plant analytical laboratory and which require a minimum of operator training. Three types of concentration procedures are compared: liquid-liquid extraction, collection in a porous polymer resin column by flowing water through the column, or collection in a porous polymer resin column by passing head space vapors through the column. (See also W74-10947) (Knapp-USGS)
W74-10974

WATER SAMPLING,
National Bureau of Standards, Washington, D.C.
P. D. LaFleur, and S. H. Harrison.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 129-134, 1974. 3 ref.

Descriptors: *Sampling, *Monitoring, *Water pollution control, Water analysis, Analytical techniques, Water quality control, *Pollutant identification.

Water quality control must use a total system approach. The particulates in the water, sediments, and organisms living in the water and in the sediments must be evaluated. Because of many variations the problems of obtaining representative samples are extremely difficult. Much of the analytical work being done today is being done on samples which do not really define the system in which they are taken. Too little care is given to the type of sampler involved, the contribution that that sampler may make to the components of interest in the analysis, and the stability of these components over a long period of time. (See also W74-10947) (Knapp-USGS)
W74-10975

ENVIRONMENTAL ANALYSIS OF OCEAN DUMPING,
Raytheon Co., Portsmouth, R.I. Oceanographic and Environmental Services.
G. V. Cox, and S. Townsend.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 155-156, 1974.

Descriptors: *Monitoring, *Sea water, *Water pollution sources, *Path of pollutants, Waste disposal, Remote sensing.

Concern for marine protection requires field monitoring programs in water, marine life and sediment quality. Ocean currents carry disposed wastes away from the dump zones. This requires a large field monitoring program. Mathematical models to predict dispersion and deposition require continuous current measurements at several depths in the water column. These models are necessary to predict zones of maximum potential impact. Use of ERTS - 1 Satellite real color and multispectral analysis helps to verify these models. (See also W74-10947) (Knapp-USGS)
W74-10977

TRANSMETHYLATION OF HEAVY METAL IONS IN WATER,
National Bureau of Standards, Washington, D.C.
K. L. Jewett, and F. E. Brinckman.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 218-225, 1974. 7 fig, 1 tab, 16 ref. EPA Grant R 801002.

Descriptors: *Heavy metals, *Mercury, *Path of pollutants, Chemical reactions, Organic compounds, *Ions.
Identifiers: *Platinum, *Palladium, *Transmethylation, Metal-organic compounds.

Biological transformations play an important role in aquatic transport of toxic metal. Thus for the palladium (II) or platinum (II) reactions with CH3Hg, or with either (CH3) 3Sn or (CH3) 3Pb, a rapid initial demethylation of the Main Group metal ion occurs, followed by a slower decomposition of transition metal methyl intermediates to eliminate available active methyl groups as inert organic gases liberated from the aqueous medium. The inhibitory or accelerative influence of anions is made very apparent. Strong ligands such as CN or SCN impede the initial transmethylation step. The formation and decomposition of the cis-dimethyldichloropalladium (II) anion with concomitant ethane ejection proceeds at a rate more rapid than the formation and decomposition of its

methyltrichloropalladium (II) precursor. This behavior is qualitatively consistent with the general appearance of several of the transient peaks seen in the NMR spectra. (See also W74-10947) (Knapp-USGS)
W74-10983

THE FLOW OF TRACE ELEMENTS THROUGH THE LOS ANGELES BASIN: ZN, CD, AND NI,
California Inst. of Tech., Pasadena. W. M. Keck Lab. of Environmental Health Engineering.
J. J. Huntzicker, C. I. Davidson, and S. K. Friedlander.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 245-250, 1974. 3 fig, 1 tab, 14 ref.

Descriptors: *Path of pollutants, Fallout, *Zinc, *Nickel, *Cadmium, *California, Roads, Water pollution sources, Dusts, Powerplants, *Trace elements, Heavy metals.
Identifiers: *Los Angeles County(Calif).

The two major sources of atmospheric Zn in the Los Angeles area are tire dust and metallurgical emissions. Tire dust contains approximately 1.5 percent by weight Zn. Most of the tire dust is associated with very large particles which settle close to the source. The primary source of airborne Ni is probably the combustion of fuel oil by power plants. The Ni content of fuel oil fly ash from the Pasadena power plant is 2 percent. The total emission of Ni is 260 kg/day. Cd is usually present in Zn ores and is emitted to the atmosphere during Zn smelting operations. Cd fallout rate is bout 5 kg/day. (See also W74-10947) (Knapp-USGS)
W74-10987

THE FLOW OF TRACE ELEMENTS THROUGH THE LOS ANGELES AREA: EFFECT ON NON-URBAN AREAS,
California Inst. of Tech., Pasadena. W. M. Keck Lab. of Environmental Health Engineering.
C. I. Davidson, J. J. Huntzicker, and S. K. Friedlander.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 251-255, 1974. 1 fig, 1 tab, 9 ref.

Descriptors: *Path of pollutants, Fallout, *Zinc, *Nickel, *Cadmium, California, Roads, Water pollution sources, Dusts, Powerplants, *Trace elements, Heavy metals.
Identifiers: *Los Angeles(Calif).

The effects of Los Angeles as a pollutant source on the surrounding non-urban areas are described. Of particular interest are the coastal waters, which are of economic, recreational and aesthetic importance to the area as a whole. The mass flows of Pb, Zn, Cd and Ni to these waters and also to the mountains and deserts surrounding the Los Angeles basin were studied. At least 3 of the 5.8 tons of Pb which are blown out of the urban basin each day are transported large distances from Los Angeles before being removed from the atmosphere. The effect of the urban basin as a pollutant source extends well beyond the geopolitical boundaries and what is an output for one geographical region is an input for the neighboring region. (See also W74-10947) (Knapp-USGS)
W74-10988

KINETIC STUDIES OF THE STABILITIES OF CHLOROMETHYL METHYL ETHER AND BIS (CHLOROMETHYL) ETHER IN HUMID AIR,
Dow Chemical Co., Midland, Mich.
J. C. Tou, and G. J. Kallos.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 298-299, 1974. 1 tab.

Descriptors: *Air pollution, *Organic compounds, Public health, Chemical reactions, Humidity, *Kinetics.
Identifiers: *Chloromethyl methyl ether.

Chloromethyl methyl ether (CMME) is one of the most commonly used chloromethylating agents in the manufacturing of commercial ionic resins. One of the impurities known to be present in CMME is bis (chloromethyl) ether (bis-CME). Possible industrial exposure to these two molecules and their stabilities in the environmental air are of great concern. The stabilities of these compounds in air at the ppm level were studied at different humidities using a silicone hollow fiber probe coupled with a mass spectrometer. The hydrolysis rate is proportional to the humidity of the air. Experimental data strongly indicate that the hydrolysis does not take place in the gas phase to any significant extent, but is triggered by the reactor surface. (See also W74-10947) (Knapp-USGS)
W74-10997

CARBON-MONOXIDE-INDUCED PARTICLES FROM HOPCALITE CATALYST,
Naval Research Lab., Washington, D.C.
J. K. Musick, and F. W. Williams.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 300-304, 1974. 2 fig, 4 ref.

Descriptors: *Trace elements, *Air pollution, *Heavy metals, *Catalysts, Chemical reactions, Aerosols.

High concentrations of metal-containing condensation nuclei are sometimes thermally induced from stabilized catalysts containing chromium, copper, and nickel under conditions closely resembling those found in automobile exhausts. Also, commercial and developmental catalyst formulations emit fine particles under a broad range of conditions at temperatures varying from 185 to 800C both in filtered air and in a mixture of 3 percent carbon monoxide in nitrogen. The emission of particles from hopcalite catalyst exposed to CO shows a concentration dependence which is related to time. The lower the CO concentration the longer it takes to realize particle production. (See also W74-10947) (Knapp-USGS)
W74-10998

THE PRODUCTION RATE OF SULFATE AEROSOL IN THE STRATOSPHERE: ENVIRONMENTAL IMPLICATIONS OF A STRATOSPHERIC AIRCRAFT FLEET,
California Inst. of Tech., Pasadena. W. M. Keck Lab. of Environmental Health Engineering.
J. J. Huntzicker.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 305-309, 1974. 1 fig, 13 ref.

Descriptors: *Sulfates, *Air pollution, *Aircraft, Chemical reactions, *Aerosols.

Stratospheric increases in aerosol loading will change the global albedo and possibly bring about climatic alteration. It is therefore quite important that the problem of aerosols associated with aircraft emissions in the stratosphere be thoroughly investigated. Current domestic jet fuels contain about 0.08% sulfur by weight. (See also W74-10947) (Knapp-USGS)
W74-10999

QUALITY OF WATER AND SUSPENDED SEDIMENTS IN THE BAKSAN AND MALKA RIVERS (O KACHESTVE VODY I VZVESHENNYKH NANOSOV REK BAKSANA I MALKI),
I. A. Dolgushev.
Pochvovedeniye, No 7, p 137-140, July 1973. 1 fig, 3 tab, 7 ref.

Descriptors: *Sediments, *Suspended solids, *Suspended load, *Water quality, *Water chemistry, Water analysis, Chemical analysis, Sampling, Inorganic compounds, Nutrients, Nitrogen, Phosphorus, Potassium, Irrigated land, Irrigation water, Irrigation, Irrigation canals, Sediment discharge, Sediment load, Particle size.
Identifiers: *USSR, *Baksan River(USSR), *Malka River(USSR).

Sediment particle size and chemical composition, and presence of potassium, phosphorus, nitrogen, and elements harmful to plants were determined in sediment discharge and waters of the Baksan and Malka Rivers in 1967-68. Waters of the Baksan and Malka Rivers are suitable for irrigation of all crops grown on irrigated lands of the basin. Suspended river sediments have fertilizing properties and can be transported to irrigated fields by silt-free canals. The content of nitrogen, phosphorus, and potassium increases with decreasing particle diameter, reaching a maximum in particles less than 0.05 mm in diameter. (Josefson-USGS)
W74-11012

NEW ANALYTICAL SOLUTIONS FOR DYE DIFFUSION EQUATIONS,
Princeton Univ., N.J. Water Resources Program.
For primary bibliographic entry see Field 2E.
W74-11021

ASSESSMENT OF SELECTED RANN ENVIRONMENTAL MODELLING EFFORTS,
Washington Univ., Seattle.
For primary bibliographic entry see Field 6A.
W74-11038

MOLECULAR SIZE AND SPECTRAL CHARACTERIZATION OF ORGANIC MATTER IN A MEROMICTIC LAKE,
British Columbia Univ., Vancouver. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2H.
W74-11067

ENVIRONMENTAL POLLUTION THROUGH CHEMICAL PROCESSING OF WOOD (UMWELTBELASTUNG DURCH HOLZCHEMISCHE PROZESSE),
W. Schweers.
Mitteilungen der Bundesforschungsanstalt fuer Forst- und Holzwirtschaft, No 93 (3. Hamburg-Reinbeker Forst- und Holztagung 1973, Holzwirtschafliches Symposium 15. bis 16. Mai 1973), p 171-183, Sept 1973. 12 tab, 6 ref.

Descriptors: *Pulp wastes, *Waste water(Pollution), *Pulp and paper industry, Air pollution, Water pollution sources, Waste water treatment, Biochemical oxygen demand, Suspended solids, Lignins, Fibers(Plant), Oxygen, Bleaching wastes, Sulfur compounds, Organic loading, Industrial wastes, Effluents.
Identifiers: *Germany(West Germany).

Water and air pollution caused by the West German forest products industries and methods for environmental control are discussed and evaluated. Statistical data are tabulated for yearly tonnage productions of chemical (sulfite and kraft) and mechanical (groundwood) pulps, paper and paperboard, hardboards, insulating and related building boards, along with indications of the corresponding 5-day BOD, suspended solids, and atmospheric emission loads of mill effluents. The total 5-day BOD of all German wood-chemical in-

dustrial wastes was estimated at 175,420,000 t in 1970. Various methods for reductions in BOD, water and chemical consumptions, and fiber and lignin losses are indicated. Most of the systems of practical use are based on the recycling of condensates and other process streams, some with and some without full or partial biological treatment of effluents. Oxygen bleaching of pulp and the possible development of non-sulfur pulping processes for prevention of pollution are also mentioned. (Ward-IPC)
W74-11074

THE USE OF AN ELECTRON CAPTURE DETECTOR FOR THE DETERMINATION OF PESTICIDES IN WATER,
Ustav Hygieny, Bratislava (Czechoslovakia).
For primary bibliographic entry see Field 5A.
W74-11077

MERCURY ORGANIC MATTER ASSOCIATIONS IN ESTUARINE SEDIMENTS AND INTERSTITIAL WATER,
Florida State Univ., Tallahassee. Dept. of Oceanography.
S. E. Lindberg, and R. C. Harriss.
Environmental Science and Technology, Vol 8, No 5, p 459-462, May, 1974. 1 fig, 2 tab, 22 ref.

Descriptors: *Mercury, Ecological effects, *Organic matter, *Interstitial water, Sediments, Solubility, Salinity, Environmental control, Estuaries, *Florida.
Identifiers: *Anthropogenic additions, *Florida Everglades, *Mobile Bay Estuary.

Potential ecological effects of anthropogenic additions of mercury to natural environments are studied in the Florida Everglades and Mobile Bay Estuary. Significant associations were found between sediment mercury and sediment organic matter and between dissolved interstitial mercury and dissolved organic carbon. Interstitial water and sediments were sampled, both from surface and subsurface areas. With limited data, it appears that increasing salinity has a negative effect on the mercury complexing capacity of the dissolved organic matter. Interstitial dissolved mercury is enriched from 2.6 to 36.0 times over the associated surface water values, and in sulfide-rich pore waters far exceeds the thermodynamic solubility of HgS. This enrichment is probably due to formation of organic and polysulfide complexes with mercury. (Prague-FIRL)
W74-11122

HISTORY OF METAL POLLUTION IN SOUTHERN CALIFORNIA COASTAL ZONE,
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 5A.
W74-11130

MERCURY CONTAMINATION OF VEGETATION DUE TO THE APPLICATION OF SEWAGE SLUDGE AS A FERTILIZER,
Toronto Univ. (Ontario). Inst. of Environmental Sciences and Engineering; Toronto Univ. (Ontario). Dept. of Geology; and Toronto Univ. (Ontario). Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W74-11133

MAINTENANCE DREDGING, NEW HAVEN HARBOR, CONNECTICUT (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Corps of Engineers, Waltham, Mass. New England Div.
For primary bibliographic entry see Field 4C.
W74-11140

A BILL TO PROVIDE FOR A FEDERAL ECOLOGICAL PRESERVE.
For primary bibliographic entry see Field 6E.
W74-11150

OIL POLLUTION AND MARINE ECOLOGY,
University Coll. of Swansea (Wales). Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W74-11166

HYGIENIC EVALUATION OF SURFACE WATERS IN THE TRANSCARPATHIAN REGION, (IN RUSSIAN),
N. F. Grishchenko, M. Yu. Blyumberg, and V. A. Sabov.
Gig Sanit. Vol 37, No 7, p 95, 1972.

Descriptors: *Surface water.
Identifiers: Transcarpathia, USSR.

Most of the surface water in the Transcarpathian region of the USSR is hygienically satisfactory due to a high dilution factor and self-purification. Increasing effluent discharge requires additional waste water treatment facilities.--Copyright 1974, Biological Abstracts, Inc.
W74-11171

ECOLOGICAL RESEARCH, ERADICATION OF MOSQUITOES, AND PROTECTION OF NATURE,
Universite Scientifique et Medicale de Grenoble (France).
G. Pautou, B. Gilot, and G. Ain.
Nat Belg. Vol 54, No 3, p 105-115, 1973. Illus.

Descriptors: *Organophosphorus pesticides, Biodegradation, Insect control.
Identifiers: Aedes cinereus, Aedes sticticus, Aedes vexans, Anopheles maculipennis, Carex acutiformis, Culex pipiens, Culiseta annulata, Culiseta morsitans, Lysimachia nummularia, Mosquitoes, Pharagmites communis, Ranunculus repens, Valeriana officinalis, Rhone Valley.

The proliferation of mosquitoes in the Rhone Valley, notably between Seyssel and Lyon (France), has necessitated ecological studies in order to eradicate the mosquitoes while maintaining maximal biological equilibrium. Of the 25 spp. of mosquitoes, only the 8 which are harmful to man were the object of the present anti-larval campaign. Eradication is being carried out on 4 ecological levels. Level 1 (permanently immersed Phragmites communis) contains species which lay eggs on the water: Culiseta morsitans, Culex pipiens, Anopheles maculipennis, Culiseta annulata. Level 2 (Phragmites communis and Carex acutiformis) contains species of Aedes with average to short larval cycles. Leverl 3 (Carex acutiformis and Valeriana officinalis) contains species of Aedes with average to short larval cycles. Level 4 (Ranunculus repens and Lysimachia nummularia) is infested with Aedes of short larval cycles: A vexans, A. sticticus and A. cinereus. Only minimal doses of biodegradable organic phosphorus insecticides with low toxicity for surrounding fauna are used, and chemical treatments are applied only to deposits containing larvae of target species. Physical techniques (e. g., sanitary engineering, maintenance of ditches and drains) yielded satisfactory results. This plan has successfully controlled harmful mosquitoes with minimal environmental pollution. Similar programs are being carried out on the Mediterranean and Atlantic coasts of France.--Copyright 1974, Biological Abstracts, Inc.
W74-11189

INVESTIGATIONS ON THE VIABILITY OF TRICHOMONAS VAGINALIS IN TAP WATER AND PUBLIC SWIMMING POOLS, (IN RUSSIAN),
Bonn Univ. (West Germany). Institut fuer Medizinische Parasitologie.
G. Piekarski, M. Saathoff, and D. Stueer.
Zentralbl Bakteriol Parasitenkd infektionskr Hyg Erste Abt Orig Reihe B Hyg Praev Med. Vol 157, No 2/3, p 202-214, 1973. English summary.

Descriptors: *Potable water, *Swimming pools.
Identifiers: *Trichomonas vaginalis.

T. vaginalis from cultures and vaginal secretions were suspended in tap water and bath water (Cl content: 0.44-0.56 mg/l). Different survival times were obtained, depending on the density of trichomonads. About 15 cells/2 million trichomonads survived up to 8 hr in 5 ml tap or bath water. Only a few trichomonads survived after 10 min in 240-480 ml tap water, and only up to 5 min in the same amount of bath water. Inundiluted culture medium (kept at 22C) a few trichomonads were capable of reproduction for up to 8 days and up to 24 hr in freshly obtained, undiluted vaginal secretion. Bath water and filter sludge from a public bath contained, in addition to free-living flagellates and ciliata, isolated worm eggs and nematode larvae, but no trichomonads. Free-living flagellates demonstrated microscopically could not be cultured. Trichomonads can be kept alive for a longer time in undiluted vaginal secretaion. Direct contact with toilet seats or bath grids contaminated with trichomonad secretion will easily cause infection. Wet bathing suits must not be exchanged.--Copyright 1974, Biological Abstracts, Inc.
W74-11193

FORECASTING OIL SLICK BEHAVIOR--A PRELIMINARY GUIDE,
Coast Guard, Washington, D.C. Applied Technology Div.
F. L. Orthlieb.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-762 358, Price $3.00 printed copy; $2.25 microfiche. Office of Research and Development In-House Study Report 724107.1, July 1971. 9 p, 2 fig, 3 ref.

Descriptors: *Oil pollution, *Oil spills, *Path of pollutants, Winds, Currents(Water), Oily water, Water pollution sources.
Identifiers: *Oil slicks.

A method is proposed for predicting the behavior of oil slicks at sea. It permits estimation of the growth of an oil slick due either to a sudden release of a known volume of oil, or to a continuous oil flow. Empirical observations are used as the basis for estimating slick drift due to wind and currents. The results for slick growth and drift can be combined to produce an approximate forecast of slick size and position versus time, as an aid to pollution control and cleanup activities until such time as more sophisticated modelling techniques are developed. (Knapp-USGS)
W74-11202

ENVIRONMENTAL EFFECTS OF PETROCHEMICAL WASTE DISCHARGES ON TALLABOA AND GUAYANILLA BAYS, PUERTO RICO,
Environmental Protection Agency, Athens, Ga. Surveillance and Analysis Div.
For primary bibliographic entry see Field 5C.
W74-11228

EFFECT OF CATTLE FEEDLOT VOLATILES, ALIPHATIC AMINES, ON CHLORELLA ELLIPSOIDEA GROWTH,
Agricultural Research Service, Fort Collins, Colo.
For primary bibliographic entry see Field 5C.
W74-11238

SOME BACTERIOLOGICAL ASPECTS OF LAKE VILA (GERONA, SPAIN),
Instituto Nacional de Limnologia, Santo Tome (Argentina).
For primary bibliographic entry see Field 2H.
W74-11239

EFFECTS OF SPREADING MANURE ON GROUNDWATER AND SURFACE RUNOFF,
Tennessee Univ., Knoxville. Dept. of Agricultural Engineering.
J. C. Barker, and J. I. Sewell.
Presented at the 1972 Annual Meeting, American Society of Agricultural Engineers, Hot Springs, Arkansas, June 27-30, 1972, Paper No 72-203, 10 p, 4 tab, 8 ref.

Descriptors: *Farm wastes, *Agricultural runoff, *Groundwater, *Irrigation, *Waste disposal, Sampling, Biochemical oxygen demand, Dairy industry, Slurries, Physical properties, Bacteria, Nitrates, Nitrogen, Dissolved solids, Chloride, Runoff, Surface runoff, Oxidation.
Identifiers: *Manure, *Spreading, Saturation area, Fecal coliform bacteria, Orthophosphate.

An experimental manure slurry irrigation system was established and the effects of the surface spreading of dairy manure slurry on surface runoff and groundwater quality were studied. Grab samples of surface and groundwater were collected on several dates between May 1971 and May 1972. Bacteriological analyses were performed on the samples for both total and fecal coliform bacteria. 5-day biochemical oxidation demand tests were conducted. The dissolved solids content of the filtered samples was determined, as well as nitrate nitrogen, orthophosphate, and chloride contents. Except for isolated cases, the bacterial and chemical concentrations of water samples from an area saturated with manure slurry were within the permissible criteria for raw water for public supplies. (Cartmell-East Central)
W74-11240

FECAL ELIMINATION OF ESTROGENS BY CATTLE TREATED WITH DIETHYLSTILBESTROL AND HEXESTROL,
Purdue Univ., Lafayette, Dept. of Animal Science.
M. R. Callantine, M. Stob, and F. N. Andrews.
American Journal of Veterinary Research, Vol 22, p 462-465, May, 1961. 2 tab, 13 ref.

Descriptors: *Farm wastes, *Cattle, *Sampling, Water pollution, Soil contamination, Fertilizers, Solid wastes, *Waste treatment.
Identifiers: *Estrogens, *Diethylstilbestrol, *Hexestrol, Hormones.

The estrogenic activity of the feces of estrogen-treated and control heifers in 6 groups was determined during a 24-week period following initiation of hormone treatment. Animals given 10 mg. of diethylstilbestrol orally per day excreted significantly more estrogen than did the controls or heifers subcutaneously treated with 24 or 36 mg. of either diethylstilbestrol or hexestrol. This excretion was uniformly high for the entire experimental period. Subcutaneous implantation with 36 mg. of diethylstilbestrol resulted in a greater total estrogen excretion than treatment with 24 mg. However, significant amounts of estrogen were excreted for 60 days following treatment with 24 mg. of diethylstilbestrol when compared to that excreted for 51 days following 36 mg. implantations; after this time, fecal estrogen elimination of heifers in both groups was similar to the controls. Implantation of heifers with 24 or 36 mg. of hexestrol did not result in greater fecal estrogen produced significant weekly variation in estrogen excretion. (Hargrove-East Central)
W74-11245

APPLIED AND RESIDUAL NITRATE-NITROGEN EFFECTS ON IRRIGATED GRAIN SORGHUM YIELD,
Texas A and M Univ., Lubbock. Agricultural Research and Extension Center.
For primary bibliographic entry see Field 3F.
W74-11270

NITROGEN MINERALIZATION POTENTIALS OF SOILS,
Agricultural Research Service, Beltsville, Md. Soils Lab.
For primary bibliographic entry see Field 2G.
W74-11272

RESIDUAL EFFECTS OF N15-LABELED FERTILIZERS IN A FIELD STUDY,
Illinois Univ., Urbana. Dept. of Agronomy.
For primary bibliographic entry see Field 3F.
W74-11276

PRIMING EFFECT OF N-15 LABELED FERTILIZERS ON SOIL NITROGEN IN FIELD EXPERIMENTS,
Arizona Univ., Tucson. Dept. of Soils.
R. L. Westerman, and L. T. Kurtz.
Soil Science Society of America Proceedings, Vol 37, No 5, p 725-727, September-October, 1973. 1 tab, 15 ref.

Descriptors: *Nutrient removal, *Nitrogen, Leaching, Crop response, Water pollution sources, Fertilizers, Stable isotopes, Isotope studies, *Radioisotopes, *Sudangrass.

Evidence of the 'priming effect' on the uptake of soil N by additions of conservative amounts of fertilizer N was examined in data from two recently reported field experiments. In these experiments, urea and oxamide each labeled with N15 were compared on adjacent locations in successive years with 'Sudax SX11' Sorghum-sudan hybrid as the test crop. Additions of N fertilizer increased the uptake of soil N by 17 to 45% in the first experiment and by 8 to 27% in the second experiment. In the residual cutting of the first experiment, increase in uptake of soil N by the crops speculated to be due to stimulation of microbial activity by N fertilizers which increased mineralization of soil N, thus making more soil N available for use by plants. (Skogerboe-Colorado-State)
W74-11279

USE OF NERITIC TROPHODYNAMIC CHAIN OF MOLLUSCS FOR THE STUDY OF THE TRANSFER OF METALLIC POLLUTANTS, (UTILISATION D'UNE CHAINE TROPHODYNAMIQUE DE TYPE NERITIQUE A MOLLUSQUES POUR L'ETUDE DES TRANSFERTS DES POLLUANTS METALLIQUES),
Centre d'Etudes et de Recherches de Biologie et d'Oceanographie Medicale, Nice (France).
For primary bibliographic entry see Field 5C.
W74-11287

TRACE METALS IN SEDIMENTS AND BIVALVE MOLLUSCA IN SOUTHAMPTON WATER AND THE SOLENT,
General Electricity Generating Board, Fawley, Southampton (England). Marine Biological Lab.
M. G. Romeril.
In: Revue Internationale d'Oceanographie Medicale, Vol 33, p 31-48, 1974. 9 fig, 6 ref.

Descriptors: *Mollusks, *Trace elements, *Sediments, *Absorption, Clams, Heavy metals, Zinc, Copper, Iron, Iron compounds, Bioassay, On-site investigations, Metals, Seasonal, Age, Path of pollutants, Cooling water, Water pollution sources, Water pollution effects, Power plants, Methodology.
Identifiers: *Mercenaria mercinaria, *Cerastoderma edule, Ferrous sulphate, Cockles, Hardshell clam, Accumulation.

Two species of bivalve mollusca, the hard shell clam and the common cockle, collected every other month for one year at a number of sites in Southampton Water and the Solent, England, have been analyzed to determine the concentration of zinc, copper, and iron in their soft tissues. Sediment samples from the estuary have also been analyzed. Significant variations in the metal content in the tissues occur with respect to locality, age, and season. These variations are discussed in relation to the conditions in the estuary and in particular, to metal concentrations in the sediments. (Katz)
W74-11288

CONTAMINATION OF MARINE TROPHIC CHAINS BY COBALT 60 (CONSUMPTION OF CONTAMINATED ARENICOLAE BY PLAICE AND CRABS), (CONTAMINATION DE CHAINES TROPHIQUES MARINES PAR LE COBALT 60 (CONSOMMATION D'ARENICOLES CONTAMINEES PAR DES PLIES ET DES CRABES)),
Commissariat a l'Energie Atomique Fontenacy-aux-Roses (France).
For primary bibliographic entry see Field 5C.
W74-11289

TYPICAL LEVEL OF LEAD IN MYTILUS GALLOPROVINCIALIS LMK FROM THE GULF OF TRIESTE,
Trieste Univ. (Italy).
L. Favretto, and F. Tunis.
In: Revue Internationale d'Oceanographie Medicale, Vol 33, p 67-74, 1974. 3 fig, 7 ref.

Descriptors: *Lead, *Mussels, Metals, Heavy metals, Analytical techniques, Methodology, Sampling, Quality control, Statistical methods, Statistics, Spectroscopy, Laboratory testing, Absorption, Bioassay.
Identifiers: *Mytilus galloprovincialis, *Gulf of Trieste, *Lead content determination, Atomic absorption spectroscopy, Extraction, Statistical analysis, Bioconcentration.

Lead in Mytilus galloprovincialis Lmk. from the Gulf of Trieste is considered in this study. Quality control of edible mussels is based on the typical average value and on the tolerance limits evaluated from a statistically controlled sampling. A rapid method has been developed for determining the lead content in the edible flesh. This method is based on the extraction of the pyrrolidine dithiocarbamate lead into n-heptan(2) one under controlled conditions and on the determination of the metal in the extract by atomic absorption spectroscopy. Intra-laboratory reproducibility has been defined and factors controlling accuracy have been optimalized. A statistical analysis has been performed on two samples from Duino (29 observations over a year) and from Sistiana (27 over a five-month period). Randomness of the sample has been confirmed and averages and variances between the samples do not differ significantly. (Katz)
W74-11290

LONG-TERM ANNUAL FLUCTUATIONS OF MERCURY IN THE ZOOPLANKTON OF THE EAST CENTRAL ADRIATIC,
Split Inst. of Oceanography and Fisheries, (Yugoslavia).
T. Vucetic, W. B. Vernberg, and G. Anderson.
In: Revue Internationale d'Oceanographie Medicale, Vol 33, p 75-81, 1974. 2 fig, 2 tab, 18 ref.

Descriptors: *Mercury, *Zooplankton, Water pollution sources, Plankton, Path of pollutants, Metals, Heavy metals, Aquatic life, Bioassay, Water pollution, Trace elements, Absorption, Methodology.

Identifiers: *Adriatic Sea, Metal cycling, Polyvinyl chloride production.

The mercury content has been determined in zooplankton (dry weight) collected from two stations in the coastal area from 1964-1969 and from one station in the deep Adriatic from 1967-1969. The mercury content of the zooplankton from the deep Adriatic is higher than in unpolluted areas and averaged 2.86 ppm Hg. It is possible that this is the result of polluting industries located around its shores. In the coastal area the highest values from 3(4)-16 ppm Hg were found in 1964-1965 samples and decreased to approximately 2.0 ppm for the other years. From the results of this study it would seem that the waters of the Adriatic have substantial mercury contamination. (Katz)
W74-11291

FREE AMINO ACID VARIATIONS IN THE ANCHOVY, ENGRAULIS MORDAX (GIRARD) FROM THE LOS ANGELES COASTAL AREA,
Immaculate Heart Coll., Los Angeles, Calif. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W74-11294

THE USE OF A MOBILE LABORATORY TO STUDY TEMPERATURE RESPONSE OF FISH,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology; and Virginia Polytechnic Inst. and State Univ., Blacksburg. Center for Environmental Studies.
For primary bibliographic entry see Field 5C.
W74-11297

THE ACCUMULATION AND RETENTION OF 65ZN AND 54MN BY THE PLAICE, PLEURONECTES PLATESSA L.,
Ministry of Agriculture, Fisheries and Food, Lowestoft (England). Fisheries Radiobiological Lab.
For primary bibliographic entry see Field 5C.
W74-11299

THE ACCUMULATION AND RETENTION OF 59FE AND 58CO BY THE PLAICE, PLEURONECTES PLATESSA L.,
Ministry of Agriculture, Fisheries and Food, Lowestoft (England). Fisheries Radiobiological Lab.
For primary bibliographic entry see Field 5C.
W74-11300

A SEASONAL SURVEY OF THE FISHES IN THE MYSTIC RIVER, A POLLUTED ESTUARY IN DOWNTOWN BOSTON, MASSACHUSETTS,
Woods Hole Oceanographic Institution, Mass.
R. L. Haedrich, and S. O. Haedrich.
Estuarine and Coastal Marine Science, Vol 2, No 1, p 59-73, 1974. 4 fig, 3 tab, 29 ref.

Descriptors: *Marine fish, Analytical techniques, Biomass, Water quality, Environmental effects, Smelts, Biological communities, Estuaries, Estuarine environment, Seasonal, Statistical models, *Massachusetts.
Identifiers: *Species diversity, *Environmental quality, *Mystic River(MA), Flounder, Alewives, *Boston, Eels, Shad, Herring, Cod, Hake, Cottids, Mackerel, Pollock, Stickleback, White perch, Silvensides.

Twenty-three species of marine fishes were taken in the Mystic River during surveys conducted four times in a year to determine a measure of the environmental quality of the estuary. Winter flounder was the dominant species, with alewives and smelt abundant on a seasonal basis. Diversity H on number of species and on weight was determined and ranged from 0.33 in August to 1.03 in June and from 0.12 in August to 0.75 in March, respectively. During the warmest period, fishes tended to be found in the lower portions of the estuary but in winter they were concentrated upriver. The annual diversity H in the Mystic River is 1.19 (on numbers) and 0.71 (on weight). The values fall near the low end of the diversity scale, indicating a fairly low degree of environmental quality. (Katz)
W74-11302

THE ACCUMULATION FROM SEA WATER OF 65ZN, 54MN, 58CO AND 59FE BY THE THORNBACK RAY, RAJA CLAVATA L.,
Ministry of Agriculture, Fisheries and Food, Lowestoft (England). Fisheries Radiobiological Lab.
For primary bibliographic entry see Field 5C.
W74-11304

SHORT TERM FATE OF DIETARY DIELDRIN IN THE DIGESTIVE TRACT OF JUVENILE LAKE TROUT (SALVELINUS NAMAYCUSH),
National Marine Fisheries Service, Ann Arbor, Mich. Great Lakes Fishery Lab.
For primary bibliographic entry see Field 5C.
W74-11308

A KEROSENE-LIKE TAINT IN THE SEA MULLET, MUGIL CEPHALUS (LINNAEUS) I. COMPOSITION AND ENVIRONMENTAL OCCURRENCE OF THE TAINTING SUBSTANCE,
Department of Primary Industries, Hamilton, (Australia). Sandy Trout Food Preservation Research Lab.
For primary bibliographic entry see Field 5C.
W74-11312

THE COMBINED EFFECT OF HIGH SALINITY AND TEMPERATURE ON THE SURVIVAL OF YOUNG LIMANDA LIMANDA,
Leeds Univ. (England). Wellcome Marine Lab.
For primary bibliographic entry see Field 5C.
W74-11314

ECOLOGICAL STUDIES IN ARTIFICIAL STREAMS. III. THE SEASONAL CHANGE IN THE RELATIONSHIP OF HETEROTROPH TO PHOTOTROPHIC BIOMASSES IN DIFFERENT SEWAGE CONCENTRATIONS, (OKOLOGISCHE UNTERSUCHUNGEN AN MODELLFLIESSGEWASSERN. III. DIE JAHRESZEITLICHEN VERANDERUNGEN IM VERHALTNIS VON HETEROTROPHER ZU PHOTOTROPHER BIOMASSE BET VERSCHIEDENEN ABWASSERBLASTUNGEN),
Eidgenossische Anstalt fuer Wasserversorgung, Abwasserreinigung und Gewasserschutz, Zurich (Switzerland).
For primary bibliographic entry see Field 5C.
W74-11317

ECOLOGICAL STUDIES IN ARTIFICIAL STREAMS. IV. SELF PURIFICATION AND BIOMASS PRODUCTION IN A DOMESTIC SEWAGE GRADIENT, (OKOLOGISCHE UNTERSUCHUNGEN AN MODELLFLIESSGEWASSERN. IV. AUSWIRKUNG DER SELBSTEINIGUNG AUF DIE BIOMASSEBILDUNG IN EINEM ABWASSERGRADIENTEN),
Eidgenossische Anstalt fuer Wasserversorgung, Abwasserreinigung und Gewasserschutz, Zurich (Switzerland).
For primary bibliographic entry see Field 5C.
W74-11318

DISTRIBUTION OF TOTAL MERCURY IN THE FISHES OF LAKE OAHE,
Environmental Protection Agency, Kansas City, Kans. Region VII.
C. M. Walter, H. G. Brown, and C. D. Hensley.
Water Research, Vol 8, No 7, p 413-418, 1974. 1 fig, 6 tab, 9 ref.

Descriptors: *Mercury, Absorption, Bioassay, Freshwater fish, Sport fish, Analytical techniques, Bass, Pikes, Catfishes, Sediments, Microorganisms, Organic compounds, Path of pollutants, *South Dakota.
Identifiers: *Lake Oahe(SD), *Methyl mercury, Methylation, Crappie, Buffalo fish, Burbot.

The total mercury content of fish and sediment in Lake Oahe, South Dakota was investigated in 1971. Average total mercury concentration of 225 fish flesh samples was 0.27 mg/kg; game fish samples averaged 0.31 mg/kg and nongame fish samples averaged 0.22 mg/kg. Data include total mercury analyses of 43 sediment samples. Results support the contention that a continuous mercury methylation process in the sediments will eventually contaminate a fish population even though analysis indicates undetectable levels of total mercury (<0.2 micro mg/l) in the overlying water. It is also indicated that game fish show a greater propensity to accumulate mercury forms than nongame fish. (Katz)
W74-11319

NUMERICAL INDICES APPLIED TO THE RESULTS OF A SURVEY OF THE MACRO-INVERTEBRATE FAUNA OF THE TAMAR CATCHMENT (SOUTHWEST ENGLAND),
Cornwall River Authority, Launceston (England).
P. M. Nuttall, and J. B. Purves.
Freshwater Biology, Vol 4, No 3, p 213-222, 1974. 3 fig, 1 tab, 39 ref.

Descriptors: *Evaluation, *Water quality, *Invertebrates, Quality control, Theoretical analysis, Water analysis, Bioindicators, Habitats, Biological communities, Sewage effluents, Farm wastes, Water pollution effects, Analytical techniques, Benthos.
Identifiers: *Numerical indices, *Diversity index, *River Tamar(England).

A survey of the macro-invertebrate fauna in the River Tamar shows a division of the catchment can be made which separates an organically enriched upper region from a more stable environment in the lower tributaries and reaches. Invertebrate species associated with organic pollution were found downstream from farm waste and sewage effluent outfalls. Invertebrate species normally associated with an unpolluted condition were widely distributed throughout the catchment, and revealed that the Tamar is essentially free from gross pollution causing the elimination of stream fauna. Systems used by pollution control organizations to codify biological results are reviewed and applied comparatively to the results. The Diversity index was found to be the most consistent method in assessing the biological state of the river. (Katz)
W74-11322

CHLORINATED INSECTICIDE RESIDUES IN THE EGGS OF SOME FRESHWATER FISH,
Iowa Univ., Iowa City. State Hygienic Lab.
For primary bibliographic entry see Field 5C.
W74-11323

ECOLOGICAL IMPLICATIONS OF HEAVY METAL IN FISH FROM THE SEVERN ESTUARY,
Bath Univ. (England).
For primary bibliographic entry see Field 5C.
W74-11325

METHYLMERCURY EXPOSURE, MERCURY LEVELS IN BLOOD AND HAIR, AND HEALTH STATUS IN SWEDES CONSUMING CONTAMINATED FISH,
National Swedish Food Administration, Stockholm. Dept. of Food Research.
S. Skerfving.
Toxicology, Vol 2, p 3-23, 1974. 9 fig, 5 tab, 45 ref.

Descriptors: *Mercury, *Human pathology, Public health, Path of pollutants, Foods, Water pollution, Metals, Bioassay.
Identifiers: *Methylmercury, *Fish consumption, Half-life.

Levels of total mercury in blood cells ranging 8-390 ng/g were found in 162 Swedes who consumed fish containing 0.3-7 mg Hg/kg. Levels were seen to correlate to the age of the subject, with subjects over 40 years of age showing levels above 100 ng/g, and to the concentration of mercury in fish consumed. Long-term exposure to 4 micrograms Hg as methylmercury/kg body weight/day--as estimated from fish intake records--corresponded to a blood cell mercury of about 300 ng/g. The biologic half-time of mercury in blood cells ranged from 58-87 days in 4 subjects, up to 164 days in one individual. No clearcut signs of methylmercury poisoning were found in the screened subjects. Some subjects had various symptoms, but with no statistically higher frequency in the high-mercury (82-1100 ng/g blood cells) group than in the low mercury (12-75 ng/g) group. (Katz)
W74-11330

HEXACHLOROBENZENE (HCB) RESIDUES IN FISH,
Bureau of Sport Fisheries and Wildlife, Columbia, Mo. Fish-Pesticide Research Lab.
For primary bibliographic entry see Field 5C.
W74-11331

THE OCCURRENCE OF SOME TRACE METALS IN COASTAL ORGANISMS WITH PARTICULAR REFERENCE TO THE SOLENT REGION,
Southampton Univ. (England). Dept. of Oceanography.
T. M. Leatherland, and J. D. Burton.
Journal of the Marine Biological Association of the United Kingdom, Vol 54, p 457-468, 1974. 1 fig, 5 tab, 38 ref.

Descriptors: *Absorption, *Trace elements, *Sediments, Bioassay, Neutron activation analysis, Arsenic compounds, Cadmium, Mercury, Zinc, Bottom sediments, Methodology, Analytical techniques, Algae, Molluscs, Path of pollutants, Environmental effects, Geochemistry, Spectrophotometry, Freshwater, Sewage.
Identifiers: *Bottom mud, *Solent(UK), Accumulation, Antimony, Southampton water, Fucus ssp, Littorina ssp, Tealia ssp.

Measurements were made, by neutron activation analysis, of arsenic, cadmium, antimony, mercury and zinc in organisms and bottom muds from Southampton Water and Solent. The values are on a dry weight basis and refer primarily to whole organism soft tissues. Concentrations of mercury in algae ranged from 0.07 to 0.22 ppm and those in animal tissues from 0.06 to 1.9 ppm. Variations among organisms from different parts of the solent area and comparisons with other regions suggested some possible influences of local waste discharge, but there was no evidence of major effects. Anoxic muds contained higher concentrations of mercury than occurred in unreduced surface layers, suggesting mobility in interstitial waters of the uppermost zone and fixation under reducing conditions. The average concentrations of cadmium in algae and fish from substantially unpolluted waters were 0.3 and 0.03 ppm, respectively, while the range for marine Gastropod and Lamellibranch molluscs was from 0.3 to 21 ppm. Increased concentrations, by about two orders of magnitude, were found in Fucus serratus and Littorina littoralis from the Severn Estuary. Bottom muds from areas of low pollution contained, on average, 0.6 ppm. Concentrations of arsenic in molluscs were in the range from 3 to 24 ppm, while fish muscle contained an average of 5 ppm. Relatively high concentrations occurred in Tealia (72 ppm). Antimony occurred usually in the range from 0.01 to 0.1 ppm, with low values in fish muscle. The average concentrations of arsenic and antimony in bottom muds from Southampton Water were 14 and 1.0 ppm respectively. (Katz)
W74-11332

POLYCHLORINATED BIPHENYLS AND P,P' DDE IN GREEN TURTLE EGGS FROM ASCENSION ISLAND, SOUTH ATLANTIC OCEAN,
Florida Univ., Gainesville. Dept. of Food Science.; and Florida Univ., Gainesville. Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W74-11335

TRACE METALS IN LAKE CAYUGA LAKE TROUT (SALVELINUS NAMAYCUSH) IN RELATION TO AGE,
Corning Glass Works, N.Y. Research and Development Lab.
For primary bibliographic entry see Field 5C.
W74-11336

QUALITATIVE STUDIES ON THE METABOLISM OF NAPTHALENE IN MAIA SQUINADO (HERBST),
Marine Biological Association of the United Kingdom, Plymouth (England). Plymouth Lab.
For primary bibliographic entry see Field 5C.
W74-11339

THE GROWTH KINETICS OF ISOCHRYSIS GALBANA IN CULTURES CONTAINING SUBLETHAL CONCENTRATIONS OF MERCURIC CHLORIDE,
Marine Biological Association of the United Kingdom, Plymouth (England).
For primary bibliographic entry see Field 5C.
W74-11340

STUDIES ON THE MECHANISMS OF RED TIDE OCCURRENCE IN HAKATA BAY, 3. THE CHARACTERISTICS OF EFFECTIVE BOTTOM MUD AND ITS GEOGRAPHICAL DISTRIBUTION PATTERN, (IN JAPANESE),
Kyushu Univ., Fukuoka (Japan). Faculty of Agriculture.
For primary bibliographic entry see Field 5C.
W74-11341

THE FLAGELLATA EXAMINED FROM POLLUTED WATER OF THE INLAND SEA, SETONAIKAI,
Hiroshima Univ. (Japan).
For primary bibliographic entry see Field 5C.
W74-11342

COPEPOD AND CHLOROPHYLL A CONCENTRATIONS IN RECEIVING WATERS OF A NUCLEAR POWER STATION AND PROBLEMS ASSOCIATED WITH THEIR MEASUREMENT,
Woods Hole Oceanographic Institution, Mass.
E. J. Carpenter, S. J. Anderson, and B. B. Peck.
Estuarine and Coastal Marine Science, Vol 2, No 1, p 83-89, 1974. 1 fig, 4 tab, 12 ref.

Descriptors: *Cooling water, *Copepods, *Chlorophyll, Plankton, *Thermal pollution, Heated water, Cooling water, Water pollution sources, *Nuclear power plants, Sampling, Methodology, Water quality.
Identifiers: Chlorophylla.

Copepod and chlorophyll a concentrations were measured in the sea water mixing zone of cooling water from a nuclear power plant and in a control area (containing no cooling water). No significant differences were observed between the two areas for these parameters; however, it is known that about 70% of the copepods and 80-100% of the phytoplanktonic photosynthesis are eliminated in the 95,000 cu m/h of sea water entrained through the power plant. From the data collected, which consisted of five replicate plankton tows or chlorophyll measurements at each of four stations on five dates, it was calculated that the sampling program was not able to detect the (approximate) 5% reduction that occurred in population size. These data indicate the importance of determining the ability of a sampling program to measure a population change before concluding that a suspected pollutant has not affected the population. It also shows the inability of conventional methods of measuring plankton densities to detect relatively small changes. (Katz)
W74-11343

BIODEGRADATION OF MIREX BY SEWAGE SLUDGE ORGANISMS,
Florida Univ., Gainesville. Pesticide Research Lab.
P. S. L. Andrade, Jr., and W. B. Wheeler.
Bulletin of Environmental Contamination and Toxicology, Vol 11, No 5, p 415-416, 1974. 1 tab, 3 ref.

Descriptors: *Sewage sludge, *Biodegradation, Methodology, Analytical techniques, Chromatography, Sludge, Radioisotopes, Aerobic conditions, Anaerobic conditions, Pollutant identification.
Identifiers: *Mirex.

Uniformly labelled 14C-Mirex was incubated with sewage sludge under both aerobic and anaerobic conditions to investigate possible biodegradation of the compound. The data indicate that under experimental conditions, sewage sludge microbes degrade Mirex in anaerobic conditions. The structure of the metabolite and identity of the Mirex-degrading organism are unknown. (Katz)
W74-11345

DDT, DDE, AND PCBS IN THE TISSUES OF REEF DWELLING GROUPERS (SERRANIDAE) IN THE GULF OF MEXICO AND THE GRAND BAHAMAS,
Texas A and M Univ., College Station.
C. S. Giam, R. L. Richardson, D. Taylor, and M. K. Wong.
Bulletin of Environmental Contamination and Toxicology, Vol 11, No 2, p 189-192, 1974. 1 fig, 1 tab, 10 ref.

Descriptors: *Gulf of Mexico, *Chlorinated hydrocarbon pesticides, *DDT, *DDE, *Polychlorinated biphenyls, Absorption, Bioassay, Public health, Pollutants, Pesticides, Path of pollutants, Distribution, Reefs, Coral.
Identifiers: *Grouper, *Serranidae, Bahamas, Epinephelus ssp, Mycteroperca ssp.

The levels of chlorinated hydrocarbons in the muscle tissues of groupers were investigated. Groupers spend most of their post larval life in one location, thus providing data most representative of the area, in this case, the coral reefs of the Gulf of Mexico and the Grand Bahamas. Results of the bioassay indicate that the levels of pollutants are generally low with little danger in regard to human consumption. In the locations showing higher concentrations of chlorinated hydrocarbons than the average, the levels of pollutants in the groupers increased with increasing size. The relationship is expected, as the fat content increases with increasing size and age of the specimen. (Katz)
W74-11347

SPECTROCHEMICAL METHOD FOR THE DETERMINATION OF 36 ELEMENTS IN INDUSTRIAL EFFLUENT,
Engelhard Industries, East Newark, N.J. Instrumental Analysis Lab.
For primary bibliographic entry see Field 5A.
W74-11351

CHARACTERISTICS OF ZINC SMELTING INDUSTRIAL WASTE AND SIMULTANEOUS REMOVAL OF TOXIC ELEMENTS AND PHOSPHATES FROM IT,
Indian Defence Lab., Jodhpur.
For primary bibliographic entry see Field 5D.
W74-11354

COPPER CONTENT IN THE INSHORE AND ESTUARINE WATERS ALONG THE CENTRAL WEST COAST OF INDIA,
National Inst. of Oceanography, Panjim (India).
V. N. Sankaranarayanan, and C. V. G. Reddy.
Current Science, Vol 42, No 7, p 223-224, April, 1973. 1 fig, 2 tab, 9 ref.

Descriptors: *Copper, *Water analysis, *Estuaries, Water chemistry, Laboratory tests, Inorganic compounds, Analytical techniques, Spectroscopy, Surface runoff, Productivity, Path of pollutants.
Identifiers: *India.

The occurrence of copper in the chloroplasts, haemocyanin and in several enzymes indicates its importance in controlling productivity. Paradoxically copper concentrations of more than 1 ppm are also known to be toxic to aquatic life. This study was undertaken to determine the distribution of copper in the inshore, estuarine and river waters of the Goa coast. The concentration of copper in the bottom waters was invariably higher than in the surface in the inshore, estuarine and river waters. In the inshore region the surface values ranged from 3-46 micrograms/l and the bottom values between 10 and 76 micrograms/l. High concentrations (greater than 20 micrograms/l) at the surface and at the bottom were encountered at all sections except off Cape Ramas. A general increase in the levels toward the north was also noticeable. The ionic copper concentration in the coastal waters was predominantly controlled by land runoff. There are four important rivers opening into the sea in the region of observation. These rivers flowing through the ore bearing (iron and manganese) terrain might be picking up the element and thus perhaps be responsible for the very high values observed. (Jernigan-Vanderbilt)
W74-11358

THE CONCENTRATION CONTROL OF SOLUBLE COPPER IN A MINE TAILINGS STREAM,
Montana Univ., Missoula. Dept. of Geology.
B. I. Collins.
Geochimica et Cosmochima Acta, Vol 37, p 69-75, 1973. 2 fig, 2 tab, 10 ref.

Descriptors: *Copper, *Mine drainage, *Adsorption, *Hydrogen ion concentration, *Distribution, Drainage water, Chemical reactions, Chemical precipitation, Laboratory tests, Analytical techniques, Spectroscopy, Mine wastes, Surface runoff.
Identifiers: *Malachite, *Tenorite.

The stability fields of cupric hydroxide (determined by a cupric sensitive electrode), malachite (Cu2(OH)2CO3), and tenorite (CuO) were compared to the total dissolved copper and hydrogen ion concentration of samples from an abandoned copper mine mill tailings stream and the river into which the stream flows. A loss of four orders of magnitude total dissolved copper from the 0.001 M in the tailings pond water to the 10 to the minus 7th power M in the Ompompanoosuc River is an expected resulted in a terrain where the pH of the water is controlled by carbonate in the local rock and where normal amounts of stream sediment exist. Under such conditions, copper concentrations downstream quickly drop to near background levels. However, the loss of copper where it is not attributable to dilution is probably due to sorption by the iron hydroxide present and is not the result of precipitations of CU(II) solids. (Jernigan-Vanderbilt)
W74-11361

DETERMINATION OF TOTAL MERCURY IN AIR BY CHARCOAL ADSORPTION AND ULTRAVIOLET SPECTROPHOTOMETRY,
National Environmental Research Center, Research Triangle Park, N.C. Quality Assurance and Environmental Monitoring Lab.
For primary bibliographic entry see Field 5A.
W74-11363

SOLVENT EXTRACTION FOR THE SEPARATION OF METALS,
Rutgers The State Univ., New Brunswick, N. J.
For primary bibliographic entry see Field 5A.
W74-11365

THE AVIFAUNA OF SWEDEN AS INDICATORS OF ENVIRONMENTAL CONTAMINATION WITH MERCURY AND CHLORINATED HYDROCARBONS,
Environmental Protection Board, Stockholm, (Sweden). Wallenberg Laboratoriet.
S. Jensen, A. G. Johnels, M. Olsson, and T. Westermark.
In: Proceedings of the XVth International Ornithological Congress p 455-465, 1972, E. J. Brill, Leiden. 7 fig, 2 tab, 33 ref.

Descriptors: *Mercury, *Chlorinated hydrocarbon pesticides, *Birds, Pollutants, Environmental effects, Neutron activation analysis, Water birds, Game birds, Migratory birds, Food chains, Predation, *Bioindicators.
Identifiers: *Sweden.

Predatory birds were used to investigate the historical development of mercury contamination and as biological indicators of environmental contamination. Carnivores were used in these studies because higher concentrations of pollutants associated with the top levels of the food chain made quantitative analysis easier. Analyses of a number of accurately dated specimens of the Goshawk from Sweden indicated that the original level of mercury content of feathers was 2200ng/g. Use of inorganic mercury compounds for seed dressing beginning in the 1940's resulted in levels of approximately 20,000ng/g before legislation was passed prohibiting their use in 1966. The effects of mercury contamination of the aquatic environment on predatory birds were investigated by analyzing the feathers of Osprey and the Great Crested Grebe, both of which live chiefly on fish. The increase of mercury in these species was gradual. The seasonal migration of the Osprey resulted in mercury concentrations which varied according to the time of year. Birds from brackish water environments exhibited concentrations of mercury and chlorinated hydrocarbons in muscle tissue and extractable fat, respectively. (Jerome-Vanderbilt)
W74-11367

MERCURY POLLUTION,
HSMHA Health Reports, Vol 86, No 5, p 414-415, May, 1971 1 photo.

Descriptors: *Mercury, *Water pollution, *Great Lakes, *Public Health, *Fish, Pollutants, Metals, Environmental effects, Effluents, Industrial wastes, Sediments, Regulation, Water quality control, Data collections, Flow, Human pathology.
Identifiers: *Lake St Clair, *St Clair River.

A brief general report on the sources of mercury pollution and its effects is presented. Mercury pollution in the Great Lakes area resulted from the dumping of untreated effluents by chloralkali factories, paper manufacturing plants, and other industrial sources. Government action prohibited all commercial fishing in the Michigan waters of Lake St. Clair and the St. Clair River, and industrial plants have generally ceased the dumping of mercury. The Food and Drug Administration has set 0.5 ppm as a safe mercury level and some fish in Lake St. Clair have exhibited mercury concentrations as high as 7ppm. Although the flushing time of the lake is one year, this does not apply to the lake bottom sediments and the fish; it will take much longer before mercury levels are considered safe. Although there have been no reported cases of mercury poisoning due to Lake St. Clair fish, some minor or early cases may have escaped notice. (Jerome-Vanderbilt)
W74-11368

OXIDATION EFFECT ON THE ANALYSIS OF IRON IN THE INTERSTITIAL WATER OF RECENT ANOXIC SEDIMENTS,
Case Western Reserve Univ., Cleveland, Ohio. Dept. of Geology.
B. N. Troup, O. P. Bricker, and J. T. Bray.
Nature, Vol 249, p 237-239, May 17, 1974. 2 fig, 17 ref.

Descriptors: *Iron, *Oxidation, *Sediments, *Sampling, Connate water, Nitrogen, Analytical techniques, Anaerobic conditions, *Chesapeake Bay, Water pollution sources.
Identifiers: *Anoxic sediment.

The importance of oxidation in the studies on the concentration of trace constituents in the interstitial water of anoxic sediments in the Chesapeake Bay was evaluated. Nine cores were taken in rapid succession; a layer of each core, 67-72cm below the sediment-water interface, was extruded, homogenized and loaded into two 2.5cm squeezers. One of the pair of squeezers from each core was never exposed to the atmosphere and was manipulated under nitrogen. The second squeezer of each pair was removed from the nitrogen glove bag after loading and exposed to the atmosphere for 15min with its top removed. An aliquot was taken simultaneously from each of the squeezers after 15ml of interstitial water had been squeezed. It was concluded that discrete sampling and analysis of the aliquot directly from the squeezer, under a nitrogen atmosphere, is the best method of ensuring analytical accuracy, and the rapid change in Fe(II) concentration observed in the initial period of squeezing must result from the oxidation of ferrous ion to ferric hydroxide by the small amount of oxygen trapped in the squeezer during transfer of sediment from the core to the squeezer. (Jernigan-Vanderbilt)
W74-11379

PREDICTING CHELATE PERFORMANCE IN BOILERS,
J. Stephens, and J. Walker.
Industrial Water Engineering, Vol 10, No 4, p 30-32, July/August, 1973. 1 fig, 6 ref.

Descriptors: *Chelation, *Magnesium, *Calcium, *Chemical precipitation, Chemical reactions, Analytical techniques, Spectroscopy, Industrial water, *Nitrilotriacetic acid.

The objective was to determine the ability of NTA to prevent calcium precipitation in the presence of potential precipitating anions such as carbonate, silicate, and phosphate. The results of the study, which was performed in a test boiler operating at 200psi, clearly indicated that: (1) NTA will prevent the deposition of all calcium deposits normally encountered in boilers except calcium phosphate; (2) the amount of calcium that can be chelated by an excess of NTA in the presence of phosphate is so low that the original purpose of chelating agents is defeated by the combined chelate/phosphate treatment; and (3) magnesium deposition will not occur in chelate-treated boilers if the makeup water is at least of sodium zeolite quality, unless the silicate content or alkalinity of the boiler water is abnormally high. (Jernigan-Vanderbilt)
W74-11380

CHARACTERISTICS AND RELATIONSHIPS OF MERCURY-RESISTANT MUTANTS AND METHIONINE AUXOTROPHS OF YEAST,
Rochester Univ. School of Medicine, N.Y. Dept. of Radiation Biology and Biophysics.
For primary bibliographic entry see Field 5C.
W74-11381

MERCURY CONTENT IN FEATHERS OF SWEDISH BIRDS FROM THE PAST 100 YEARS,
Museum of Natural History, Stockholm (Sweden).
For primary bibliographic entry see Field 5A.
W74-11382

THE SEASONAL CYCLE OF COPPER CONCENTRATION IN BUSYCON CANALICULATUM L,
University of South Florida, St. Petersburg. Dept. of Marine Science.
For primary bibliographic entry see Field 5C.
W74-11384

THE DISTRIBUTION OF TRACE METALS IN THE SURFICIAL SEDIMENTS SURROUNDING KEWEENAW POINT, UPPER MICHIGAN,
Wisconsin Univ., Madison. Sea Grant Minerals Program.
P. A. Smith, and J. R. Moore.
In: Proceedings of the Fifteenth Conference on Great Lakes Research, April, 1972, Madison, Wisconsin, Sea Grant College Reprint No WIS-SG-73-341, 11 p, 7 fig, 5 tab, 14 ref.

Descriptors: *Trace metals, *Distribution, *Sediments, *Lake Superior, Data collections, Analytical techniques, Spectroscopy, Copper, Zinc, Cobalt, Nickel, Tin, Drainage, *Michigan, *Path of pollutants, Water pollution sources.
Identifiers: *Keweenaw Point(MI).

Surficial sediments around Keweenaw Point were collected during late August, 1971. The trace metal data for the recovered sediment samples are presented. Determinations are based upon 54 atomic absorption analyses (perchloric acid extraction) for Cu, Zn, Co, Ni, and Sn, using the minus 80 U.S. standard sieve mesh size fraction of the sediments. Indications are that two district areas are delineated by the results, separated from each other by the Keweenaw Fault trending east-west at a latitude of approximately 47 degrees 23 minutes north. To the south of the fault the sediments have mean value trace metal concentrations at 32.2ppm for Cu, 57.3ppm for Zn, 31.1ppm for Ni and 18.7ppm for Co. These concentrations are distributed according to drainage patterns associated with sediments deposited from streams draining a mineralized area. The northern sediments, off Copper Harbor, exhibit higher values, including 160.2ppm for Cu, 79.8ppm for Zn, 53.8ppm for Ni and 23.2ppm for Co. The enhanced concentrations to the north of the Keweenaw Peninsula appear to reflect the dominant geology of the onshore area of the northern coastline. This enrichment is in contrast to the sediments to the south of the fault where the trace metal contribution of drainage from the Peninsula has been diluted by multiple sources of sediments, especially from the Jacobsville Sandstone. (See also W74-11392) (Jernigan-Vanderbilt)
W74-11391

UNDERWATER COPPER EXPLORATION IN LAKE SUPERIOR PROSPECTS MAPPED IN 1971,
Wisconsin Univ., Madison. Sea Grant College Program.
J. R. Moore, R. P. Meyer, and R. J. Wold.
Preprint from the Offshore Technology Conference, Houston, Texas, May, 1972, Paper No OTC 1648, Sea Grant College Reprint No WIS-SG-73-338, 16 p, 11 fig, 8 ref.

Descriptors: *Sediments, *Copper, *Lake Superior, *Trace metals, Geological surveys, Geologic mapping, Seismic studies, Rock properties, Zinc, Cobalt, Tin, Nickel, Magnetic studies, *Michigan, Wisconsin, *Path of pollutants, Exploration, Baseline studies.
Identifiers: *Keweenaw Penninsula(MI).

During the late summer of 1971, marine geologists and geophysicists conducted a combined seismic, magnetometry, and dredging survey in Lake Superior waters surrounding the outer Keweenaw Peninsula. The principal objective of this continuing investigation is to assess the potential for lode copper beneath the shallow waters surrounding the Keweenaw copper producing district. Approximately 1000 track miles of (a) high resolution acoustic profiles, (b) intermediate depth air-gun seismic profiles, (c) continuous magnetometer records, and (d) some 200 dredge and grab samples of the bottom as well as coastal sediments and sublake rock exposures were collected. Subsequent to the cruise, the geophysical records have been under study, and all sediment and rock samples have been analyzed for copper, zinc, cobalt, tin, and nickel. Three areas have been identified as potential interest sites. Chemical and bathymetric data provide an environmental quality baseline in the event of subsequent mining. (See also W74-11391) (Jernigan-Vanderbilt)
W74-11392

FORMATION OF METHYLMERCURY IN A TERRESTRIAL ENVIRONMENT,
National Environmental Research Center, Las Vegas, Nev.
W. F. Beckert, A. A. Moghissi, F. H. F. Au, E. W. Bretthauer, and J. C. McFarlane.
Nature, Vol 249, p 674-675, June 14, 1974 1 fig, 6 ref.

Descriptors: *Mercury, *Bacteria, *Chemical reactions, Organic compounds, Inorganic compounds, Agriculture, Toxicity, Public health, Analytical techniques, Onsite laboratories, Metals, *Path of pollutants, Water pollution sources.
Identifiers: *Methylmercury.

The possible organomercury compound formation in soils contaminated with an inorganic mercury compound by methonogenic bacteria was investigated. Experiments were conducted and the results showed that mercuric salts can, under agricultural conditions, be transformed into methylmercury. The conversion in a terrestrail environment of inorganic mercury compounds to methylmercury implies that recycling of mercury from soil to air and back to soil or water could occur faster than presently assumed on the basis of the volatility of metallic mercury and inorganic compounds along. Due to the formation of methylmercury compounds and their high volatility mercury compounds deposited in soil are more readily available to humans and animals than previously anticipated, the consequent health hazard being magnified by the higher toxicity of methylmercury. (Jernigan-Vanderbilt)
W74-11393

A STUDY OF OIL SOURCE IDENTIFICATION TECHNIQUES,
Coast Guard, Washington, D.C. Office of Research and Development.
For primary bibliographic entry see Field 5A.
W74-11435

DIGITAL MODELING OF RADIOACTIVE AND CHEMICAL WASTE TRANSPORT IN THE SNAKE RIVER PLAIN AQUIFER AT THE NATIONAL REACTOR TESTING STATION, IDAHO,
Geological Survey, Idaho Falls, Idaho.
J. B. Robertson.
Available from NTIS, Springfield, Va., 22161 as USGS 1D0-22054, Price $4.00 printed copy; $2.25 microfiche. Open-file report 1D0-22054 (USAEC TID-4500), May 1974. 41 p, 22 fig, 13 ref.

Descriptors: *Path of pollutants, *Groundwater movement, *Idaho, *Radioactive wastes, *Mathematical models, Numerical analysis, Finite element analysis, Dispersion, Sorption, Chlorides, Tritium, Strontium, Cesium.

Industrial and low-level radioactive liquid wastes at the National Reactor Testing Station (NRTS) in Idaho have been disposed to the Snake River Plain aquifer since 1952. Tritium and chloride have dispersed over a 15sq mi area of the aquifer in low but detectable concentrations and have only migrated as far as 5mi downgradient from discharge points. The movement of cationic waste solutes, particularly Sr-90 and Cs-137, has been significantly retarded due to sorption, principally ion exchange. Cs-137 has shown no detectable migration in the aquifer and Sr-90 has migrated only about 1.5mi from the Idaho Chemical Processing Plant discharge well, and is detectable over an area of only 1.5 sq mi of the aquifer. Digital modeling techniques were applied by utilizing numerical solution of the coupled equations of groundwater motion and mass transport. The model includes the effects of convective transport, flow divergence, two-dimensional hydraulic dispersion, radioactive decay, and reversible linear sorption. Hydraulic dispersion (especially transverse) is a much more significant influence than previously suggested by earlier studies. The model was used to estimate future waste migration patterns for varied assumed hydrological and waste conditions up through the year 2000. The hydraulic effects of recharge from the Big Lost River have an important (but not predominant) influence on the simulated future migration patterns. Detectable concentrations of waste chloride and tritium could move as much as 15mi downgradient from the original discharge points by the year 2000. However, SR-90 could move only 2 to 3mi downgradient in the same time. The model may also be used to estimate the effects of the various future waste disposal practices and hydrologic conditions on subsequent migration of waste products.
W74-11439

MONITORING TOXAPHENE CONTAMINATION IN A GEORGIA ESTUARY,
Georgia Univ., Sapelo Island. Marine Inst.
R. J. Reimold, and C. J. Durant.
Available from NTIS, Springfield, Va. 22161 as COM 73-10721, Price $3.00 printed copy, $2.25 microfiche. Marine Science Center Technical Report Series No 72-8, November 1972. 17 p, 9 fig, 1 tab, 6 ref.

Descriptors: *Path of pollutants, *Pesticides, *Estuaries, *Georgia, Biomass, Marsh plants, Grasses, Salt marshes, Aquatic environment, Pollutant identification.
Identifiers: *Toxaphene, Terry Creek(GA), Spartina.

The flux of toxaphene was traced through the salt marsh cordgrass in an estuary in Georgia. The only part of the cordgrass plant accumulating toxaphene was the leaves (36 ppm). Seed heads have relatively low concentrations, and therefore, may not be a great source of contamination for marsh birds which feed upon them. The quantities of toxaphene found in anchovies collected from several collection sites during the two years of the study show a significant reduction in levels during the second year. In a carnivorous fish, Fundulus heteroclitus, toxaphene shows significant decreases in levels during the second year, and the concentrations are much lower than in the anchovy. Toxaphene appears to be concentrated in the white shrimp heads and thorax by a factor of about ten times that found in the edible abdominal portions. In the 150 species of estuarine organisms

tested, the levels of toxaphene were considerably lower in 1971-1972 than in the preceding year. A significant increase in species diversity was found in Terry Creek during the past two years. A considerably higher biomass was detected during the second year of the study. (Knapp-USGS)
W74-11443

5C. Effects Of Pollution

WATER-BORNE TRANSMISSION OF CHLORAMPHENICOL-RESISTANT SALMONELLA TYPHI IN MEXICO,
Institute of Health and Tropical Diseases, Mexico City. Epidemiology Unit.
A. Gonzalez-Cortes, D. Bessudo, R. Sanchez-Leyva, R. Fragoso, and M. Hinojosa.
Bulletin of the Panamerican Health Organization, Vol 8, No 1, p 1-5, 1974. 1 fig, 2 tab, 8 ref.

Descriptors: *Human diseases, *Potable water, *Mexico, *Salmonella, Water pollution sources, Water supply, Irrigation canals, Municipal water, *Epidemics, Water pollution effects.
Identifiers: *Typhoid fever, Salmonella typhi.

In mid-1972 an outbreak of typhoid fever occurred in a small village in Central Mexico. Eighty-three cases were recorded with six deaths. Most patients lived in an area of the village with the highest population density and lowest income levels, close to an irrigation canal which traverses the village. Prior to the epidemic, the municipal water system had not been operational because of a defective pump. Food-specific attack rates implicated the drinking of water from the canal as the source of the disease with restoration of the water system promptly halting the outbreak. (Sandoski-FIRL)
W74-10906

A NEW NATURAL FACTOR IN THE SELF-PURIFICATION OF WATER BASINS (A VIZTAROLOK ONTISZTULASANAK UJ TERMESZETES TENYEZOJE),
G. I. Szidorenko, G. A. Bagdaszarjan, and J. G. Talajeva.
Egeszsegtudomany, Vol 17, No 4, p 350-355, 1973. English summary.

Descriptors: Water pollution effects, Microorganisms, *Pathogenic bacteria, *Water purification, *Self-purification, Potable water.
Identifiers: *Bdellovibrio, Microbial contamination.

The problems of microbial contamination in open water basins and other water sources are discussed with respect to potable water and increasing industrial effects. Some microorganisms in the water and soil are known to kill human pathogens; the most exhaustively studied phenomenon is self-purification by Bdellovibrio in water basins. Culturing, biological features and temperate-zone incidence of the Bdellovibrio have been investigated in detail by the Sisin Institute since 1968. The seasonal changes in their incidence and occurrence of new strains have been documented. (Murphy-FIRL)
W74-10922

METHYLATION OF MERCURY IN LAKE AND RIVER SEDIMENTS DURING FIELD AND LABORATORY INVESTIGATIONS,
Wisconsin Univ., Madison.
For primary bibliographic entry see Field 5B.
W74-10924

EFFECTS OF DIETARY MERCURY ON MINK,
Michigan State Univ., East Lansing. Dept. of Poultry Science.
R. J. Aulerich, R. K. Ringer, and S. Iwamoto.
Archives of Environmental Contamination and Toxicology, Vol 2, No 1, p 43-61, March, 1974. 6 tab, 25 ref.

Descriptors: *Toxicity, Organic matter, Inorganic matter, *Mink, Fish, *Mercury, Great Lakes region, Food chains, Lake Erie, Lakes, Rivers, Canada, Fish toxins.
Identifiers: *Methylmercury, *Mercuric chloride.

Mercury contamination in Lake Erie and other lakes and rivers in the United States and Canada caused mink ranchers to consider the possibility that mink who ingested mercury-contaminated fish were contacting mercury poisoning. Mercury in fish tissue is in the methylated form, highly toxic to man. Tests were conducted where mink were fed dietary methylmercury; 5ppm were lethal within one month to adult mink. Mercuric chloride, the inorganic form, was not toxic at the 10ppm level. Most likely this is because the organic form easily penetrates the brain whereas the inorganic form is excreted from the body. (Prague-FIRL)
W74-10930

A FIELD TRIAL OF ABATE LARVICIDE FOR THE CONTROL OF AEDES AEGYPTI IN BANGKOK, THAILAND,
World Health Organization, Bangkok (Thailand). Aedes Research Unit.
For primary bibliographic entry see Field 5G.
W74-10934

EFFECT OF WATER SALINITY ON THE INCIDENCE OF POSTHODIPLOSTOMUM INFECTION IN FISH, (IN RUSSIAN),
Ukrainian Research Inst. of the Fish Industry, Kherson (USSR).
V. I. Kozlov.
Gidrobiol Zh. Vol 8, No 3, p 112-113, 1972.
Identifiers: Anisus-contortus, Fish, *Infection(Posthodiplostomum), *Posthodiplostomum-cuticola, *Salinity, *Mollusks, *Pathogenic bacteria.

Increased salinity was tested as a means of eliminating the mollusk Anisus contortus, the intermediate host of the pathogen Posthodiplostomum cuticola, from ponds. Water from the Gorki Estuary with a salinity level of 32.2% was added to a vimba-shemaia breeding pond. In 10 days the salinity decreased from 17.0 to 16.0 g Cl/1; in 20 days it further decreased to 13.0 g Cl/1. A cyclone caused the pond to overflow submerging the aquatic flora where many mollusks were concentrated. Within 35 days no live mollusks were found. In the following year, the incidence of Posthodiplostomum infection decreased from 70% to 10%.--Copyright 1973, Biological Abstracts, Inc.
W74-10938

ENERGETICS OF A HOST-PARASITE RELATIONSHIP AS ILLUSTRATED BY THE LEECH MALMIANA NUDA, AND THE SHORTHORN SCULPIN MYOXOCEPHALUS SCORPIUS,
Guelph Univ. (Ontario). Dept. of Zoology.
T. F. Mace, and C. C. Davis.
Oikos. Vol 23, No 3, p 336-343, 1972. Illus.
Identifiers: Energetics, *Host-parasite relationships, *Leech, Malmiana-nuda, Myoxocephalus-scorpius, *Sculpin(Shorthorn), *Fish parasites, Metabolism.

The energy budget for two groups of sculpin, M. scorpius (L.) was balanced at 10C. An accurate estimate of weekly energy expenditure could be made by calculating the metabolic energy, measuring the waste production and measuring the energy incorporated into new tissue. There was no significant difference between the summed components of energy expenditure and weekly energy input. There was a significant difference between estimated and observed energy expenditure of fish parasitized with a known weight of the leech M. nuda Richardson. This difference was proportional to the biomass of parasites and equal to 2240 cal/g of leech. The resting energy consumption of the leech was estimated from measurements of resting consumption. Stored energy was estimated by measuring the amount of blood in the gut of regularly fed leeches. The data suggest that a leech continuously fed would absorb 1600 cal of energy per week. The ratio of energy loss from the host to energy expenditures of the parasite probably is an indication of the degree of adaptation of the system. A well-adapted host-parasite relationship would exert a metabolic demand which is little more than the energy requirements of the parasite.--Copyright 1973, Biological Abstracts, Inc.
W74-10940

THE CARBON ROD ATOMIC ABSORPTION ANALYSIS OF ARSENIC IN PLANT AND ANIMAL TISSUES,
Los Angeles County Sanitation Districts, Whittier, Calif. San Jose Creek Water Quality Lab.
For primary bibliographic entry see Field 5A.
W74-10985

EVALUATION OF DIGESTION TECHNIQUES FOR THE AAS DETERMINATION OF METAL CONCENTRATIONS IN KELP,
Los Angeles County Sanitation Districts, Whittier, Calif. San Jose Creek Water Quality Lab.
For primary bibliographic entry see Field 5A.
W74-10986

CARCINOGENIC SOURCES IN FISH TUMORS FOUND IN THE FOX VALLEY WATER SHED,
Illinois Benedictine Coll., Lisle.
J. J. Hazdra, E. R. Brown, J. Baudendistel, T. Arndt, and L. Keith.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 350-355, 1974. 3 charts, 1 tab, 5 ref.

Descriptors: *Water pollution effects, *Fish diseases, *Illinois, *Canada, Animal pathology.
Identifiers: *Fox River(Ill), *Fish tumors, Carcinogens.

The fish populating the polluted Fox River system of Illinois have a higher frequency of tumors than the same species present in non-polluted Canadian rivers. The frequency was higher from May to October. This seems to correspond to the seasonal bacterial variation in pollution and bacterial count. The main variation in the 2 sites is the chemical nature of the water. As water pollution increased there is a corresponding increase in neoplastic disease in the fish population. (See also W74-10947) (Knapp-USGS)
W74-11006

FILTER SYSTEMS,
Sutcliffe, Speakman and Co. Ltd., Leigh, (England); and Alan Pond Equipment Ltd., Harlow (England). (assignees).
A. Armstrong, and G. C. Fletcher.
U.S. Patent No. 3,810,544, 4 p, 4 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 922, No 2, p 523, May 14, 1974.

Descriptors: *Patents, *Filtration, *Reclamation, *Activated carbon, *Sands, Conservation, *Wastewater treatment, Reclamined water.
Identifiers: Water reclamation system.

A filter and water reclamation system comprises two filter beds in series, one containing sand and one containing activated carbon granules, half a change of water in a cycle passing only through the sand filter, the other half passing through the sand filter and the activated carbon, the water in the system remaining at a substantially constant volume. (Sinha-OEIS)
W74-11044

ZINC TOXICITY IN HYDROPONIC CULTURE,
Guelph Univ. (Ontario). Dept. of Genetic Botany.
W. E. Rauser.
Can J Bot. Vol 51, No 2, p 301-304, 1973. Illus.
Identifiers: *Beans, *Corn(Field), Cortical cells, *Hydroponic culture, Phenolics, Pollutants, Soil, *Soybeans, *Toxicity, *Zinc.

The symptoms of zinc toxicity in beans, soybeans, and corn are described. In beans and soybeans these include the deposition of a red-brown pigment in parenchyma cells of the cortex, xylem, and phloem of veins, petioles, and stems. The pigment fills some parenchyma cells completely but is confined to the cell walls of others. The xylem vessel lacunae remain free of the pigment. Extensive disorganization of cortical cells is evident in veins. The pigment is suspected to be a polyphenolic substance of unknown biochemical origin.--Copyright 1973, Biological Abstracts, Inc.
W74-11045

SULPHAMERAZINE TOXICITY IN CUTTHROAT TROUT BROODFISH SALMO CLARKI (RICHARDSON),
Bureau of Sport Fisheries and Wildlife, Bozeman, Mont. Fish Cultural Development Center.
C. E. Smith, J. E. Holway, and G. L. Hammer.
J Fish Biol, Vol 5, No 1, p 97-101. 1973. Illus.
Identifiers: *Cutthroat trout, Fish pathology, Hemorrhage, Kidney, Mortality, Salmo-clarki, *Sulfamerazine, *Toxicity, Water pollution effects, Broodfish.

Treatment of cutthroat trout broodfish with sulphamerazine at 220 mg/kg (10 g/100 lb) of fish/day for 14 days resulted in severe kidney histopathology and increased mortality among males. Experimental data presented showed that the cutthroat trout broodfish were extremely sensitive to sulphamerazine toxicity. Hydropic degeneration of renal tubule epithelium and hemorrhage into tubule lumens were observed in kidneys of both male and female trout, but was more severe in the former. Death, which occurred only in males, was correlated with spawning stress and impaired renal function.--Copyright 1973, Biological Abstracts, Inc.
W74-11068

FISH TOXICITY SURVEY OF FOUR PRAIRIE PROVINCE PULP MILL EFFLUENTS,
Department of the Environment, Winnipeg (Manitoba). Fisheries and Marine Services.
J. S. Loch, and J. C. MacLeod.
Canadian Department of the Environment, Fisheries and Marine Services, Technical Report Series No CEN T-73-4, Feb 1973, 19 p, 1 tab, 10 ref.

Descriptors: *Toxicity, *Pulp wastes, *Bleaching wastes, *Bioassay, *Fish, Canada, Effluents, Pulp and paper industry, Water pollution sources, Industrial wastes.
Identifiers: Kraft mills, Newsprint mills, Static tests, Dynamic tests.

Rainbow trout were exposed to various concentrations of effluents from four Canadian pulp mills under either static or flow-through conditions. Effluents from the bleached kraft mill of Prince Albert Pulp Co. (Saskatchewan) showed little acute toxicity at 65 and 100% concentrations under static or dynamic test conditions, fish survivals exceeding 80%. Effluent from another bleached kraft mill (North West Pulp and Power Ltd., Hinton, Alberta), however, was significantly toxic. At 32% concentration it was lethal to 50% of all fish within 96 hr; in 65% concentration, even treated effluent assured only 10% fish survival under flow-through conditions. Extreme toxicities (less than 15% LC50) were found in both static and dynamic bioassays for effluents from an unbleached kraft pulp mill (Churchill Forest Industries, Pas, Manitoba) and from an integrated newsprint mill (Abitibi Manitoba Paper Co., Pine Falls, Manitoba). The effluent-treatment facilities at each of the four mills studied are outlined. (Witt-IPC)
W74-11075

FACTORS AFFECTING ACUTE TOXICITY BIOASSAYS WITH PULP MILL EFFLUENT,
Department of the Environment, Winnipeg (Manitoba). Dept. of Fisheries and Marine Services.
J. S. Loch, and J. C. MacLeod.
Canadian Department of the Environment, Fisheries and Marine Services, Technical Report Series No CEN-T-74-2, 1974, 37 p, 6 fig, 3 tab, 11 ref, append.

Descriptors: *Toxicity, *Bioassay, *Pulp wastes, *Fish behavior, Analytical techniques, Aeration, Oxygenation, Waste water treatment, Rainbow trout, Trout, Water pollution effects.
Identifiers: Kraft mills, Process variables, Dynamic tests, Static tests.

In studies of the influence of some basic bioassay parameters on the 96-hr acute toxicity values of pulp mill effluent against rainbow trout, flow-through techniques were found to be much more sensitive and replicable than static bioassays. The test temperature also affected the results, high temperatures yielding greater toxicity values. Proper assessment required minimum exposure periods of 96 hr. Aeration did not diminish acute toxicity under flow-through condicions, compared to nonaeration and oxygenation. The measured toxicities of pulp mill effluents varied between different mills, even after secondary treatments. Some toxicity fluctuations, though not excessive, were also found between different samples of the same effluent. (Witt-IPC)
W74-11076

LABORATORY AND CONTROLLED EXPERIMENTAL STREAM STUDIES OF THE EFFECTS OF KRAFT EFFLUENTS ON GROWTH AND PRODUCTION OF FISH,
National Council of the Paper Industry for Air and Stream Improvement, Inc., New York.
C. E. Warren.
NCASI Stream Improvement Technical Bulletin, No 259, Oct. 3, 1972, 93 p. 42 fig, 12 tab, 24 ref, 2 appendices.

Descriptors: *Water pollution effects, *Toxicity, *Fish, *Aquatic fauna, *Pulp wastes, *Waste water treatment, Effluents, Pulp and paper industry, Pacific Coast Region, United States, Salmon, Trout, Snails, Biodegradation, Aquatic life.
Identifiers: Kraft pulp mills.

Results are summarized of a six-year study of the effects of untreated vs. treated kraft pulp and paper mill effluents on the fish production of complex aquatic communities under controlled natural conditions. The fish used in these studies included salmon and trout species of both commercial and recreational importance in the West Coast region. The observed and reported effects include both adverse and relatively harmless influences of kraft mill discharges. They take into account snail and other aquatic populations that serve as fish food, and may serve as illustrative guidelines for the toxicity-reducing efficiencies of various waste water treatment systems, including primary and secondary or biological processes. (Witt-IPC)
W74-11087

POTENTIAL EFFECTS OF THERMAL DISCHARGES ON AQUATIC SYSTEMS,
Washington, Univ., Seattle. Dept. of Civil Engineering.
R. M. Bush, E. B. Welch, and B. W. Mar.
Environmental Science and Technology, Vol 8, No 6, p 561-568, June 1974. 1 fig, 7 tab, 35 ref.

Descriptors: *Aquatic fauna, *Fish, *Thermal pollution, *Water pollution effects, *Cooling water, *Water temperature, Discharge(Water), Rivers, Freshwater, Sea water, Aquatic animals, Invertebrates, Water pollution sources, Sites, Freshwater fish, Marine fish, United States, Mississippi River, Delaware River, Tennessee River, Columbia River.
Identifiers: *Sacramento River.

Ecological changes in the aquatic environment caused by temperature increases are estimated, in order to aid decisionmaking in the siting of cooling water discharges. Principal consideration is given to the fish community, for which predictions of change in composition are based on lethal and preferred temperature. Six representative river systems of the U.S. are considered, viz., the Columbia, Sacramento, Delaware, Tennessee, and Upper and Lower Mississippi Rivers. Insufficient data precluded similar estimations for communities of freshwater invertebrates, but available evidence indicates that adequate protection of fish species will provide similar shelter to other fauna. Hence estimated effects of thermal pollution on freshwater fish can suffice as a guideline for overall protection of aquatic fauna. Similar predictions for marine communities were not feasible, due to lack of thermal requirement data on seawater organisms. Existing data and site studies are summarized for use in guidelines. (Brown-IPC)
W74-11107

THE PHOSPHORUS STATUS OF EUTROPHIC LAKE SEDIMENTS AS RELATED TO CHANGES IN LIMNOLOGICAL CONDITIONS--TOTAL, INORGANIC AND ORGANIC PHOSPHORUS,
Battelle-Pacific Northwest Lab., Richland, Wash.
R. E. Wildung, R. L. Schmidt, and A. R. Gahler.
Journal of Environmental Quality, Vol 3, No 2, p 133-138, April-June, 1974. 2 fig, 3 tab, 19 ref.

Descriptors: Sampling, *Phosphorus, *Sediments, *Eutrophication, *Lakes, Carbon, *Nitrogen, Organic matter, Phytoplankton, Runoff, Biological communities, Surface waters, Turbidity, Water pollution effects, *Oregon, *Lake sediments.
Identifiers: Biological growth, *Upper Klamath Lake(OR).

The role of sediments as a source of phosphorus to lake waters and the factors which may influence sediment phosphorus release were studied. Changes with time in the phosphorus status of noncalcareous sediments of a eutrophic lake were related to changes in sediment carbon and nitrogen, surface water composition, pH, temperature, and phytoplankton growth. Sediment phosphorus status and the relationship of these changes to limnological conditions differed with locations in the lake. Changes in sediment composition were greatest in a bay which received agricultural runoff in the early spring, additional nutrients apparently providing the initial impetus for increased surface water biological activity. This was reflected in increased surface water organic carbon and nitrogen, turbidity, and phytoplankton growth. At this location, total sediment phosphorus, carbon, and nitrogen decreased during the late spring and early summer, corresponding to the period of exponential growth of the lake phytoplankton population. Results indicate that sediment inorganic phosphorus is directly related to the biological productivity of the surface waters, and in at least one location, sediments serve as a significant source of phosphorus to these waters supporting increased biological growth. (Prague-FIRL)
W74-11131

ADVANCED WASTE TREATMENT PROCESS SELECTION, PART THREE,
Culp, Wesner, Culp-Clean Water Consultants, Corona Del Mar, Calif.
G. L. Culp, and C. L. Hamann.
Public Works, Vol 105, No 5, p 71-74, May, 1974. 3 fig.

Descriptors: Ammonia, *Chlorination, *Ion exchange, *Suspended solids, Treatment facilities, Coagulation, Filtration, *Wastewater treatment, Nitrogen, Chlorine, Cold, Disinfection, Zeolites, Pilot plants, Phosphorus, *Tertiary treatment, Hydrogen ion concentration.
Identifiers: *Ammonia removal, Solids removal, Breakpoint chlorination.

As part of a study of modification of existing waste water treatment plants to meet higher effluent standards with respect to discharge of suspended solids and aquatic growth nutrients such as nitrogen and phosphorus, a discussion is presented of ammonia stripping, chlorination, ion exchange, and solids removal by coagulation/filtration processes. Ammonia stripping is the only one of the three physical-chemical techniques which has been actually tried on a full plant scale. The process consists of raising the pH of water to 10.8 to 11.5; forming and reforming droplets in a stripping tower; and providing air-water contact and droplet agitation by circulation of large quantities of air through the tower. This method is effective and reliable for nitrogen reduction in climates which are not too cold. For areas of cold weather, other methods such as breakpoint chlorination are necessary. In this method, chlorine is added to waste water containing ammonia nitrogen and reacts with hypochlorous acid to produce chloramines. Six United States plants are planning to use this process. Its advantages are low capital costs, assurance of disinfection, and conversion of ammonia to elemental nitrogen with no disposal problem. Disadvantages are the large increase in total dissolved solids. Selective ion exchange uses zeolites which are selective for ammonia relative to calcium, magnesium, and sodium. It is still in the pilot stage but seems to remove nitrogen without adding objectionable quantities of other materials, and is effective in cold weather. (Prague-FIRL)
W74-11135

THE INTENSITY OF THE FILAMENTOUS ALGAL PHOTOSYNTHETIC ACTIVITY IN THE FLOOD PLAIN LAKE NIZHNII USTUP AND MIDDLE DNIEPER, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
L. E. Kostikova.
Gidrobiol Zh. Vol 8, No 6, p 104-108. 1972.

Descriptors: *Algae, Photosynthesis.
Identifiers: Cladophora fracta, Cladophora glomerata, Dnieper, Nizhnii, Stigeoclonium lubricum, USSR.

Cladophora fracta Kutz., C. glomerata L. Kutz. and Stigeoclonium lubricum Kutz. were observed for the intensity of the photosynthetic activity. From a study of seasonal change in the photosynthetic activity, in Cladophora of the Back-Lake of Nizhnii Ustup and in Stigeoclonium of the Dnieper (both Ukrainian SSR, USSR), the photosynthesis is very intensive during the summer and fall seasons.--Copyright 1974, Biological Abstracts, Inc.
W74-11157

SEASONAL CHANGES IN THE DRIFT AND BENTHIC MACROINVERTEBRATES IN THE UNCHANNELIZED MISSOURI RIVER IN SOUTH DAKOTA,
South Dakota Univ., Vermillion. Dept. of Biology.
T. C. Modde, and J. C. Schmulbach.
Proceedings South Dakota Academy of Science, Vol 52, p 118-126, 1973. 3 fig, 1 tab, 6 ref. OWRR B-024-SDAK(2).

Descriptors: *Aquatic insects, *Aquatic drift, *Benthic fauna, *Invertebrates, Missouri River, South Dakota, Channel morphology, Standing crops, Seasonal, Diptera, Mayflies, Caddisflies, Systematics, Metabolism, Life cycles, Water level fluctuations.
Identifiers: Trichoptera, Hydropsyche.

Seasonal changes in the taxonomic and quantitative composition of the drift and benthic macroinvertebrates were investigated. Monthly samples were randomly taken from the main channel of the Missouri River at dusk. Drift organisms were collected at the water's surface with a fry net and seasonal variations in both the standing crop and taxonomic diversity were observed. Caddisfly larvae, primarily Hydropsyche spp., dominated the drift macroinvertebrates during the period between October and February. Dipteran larvae, pupae and adults constituted more of the drift standing crop between March and May. During the summer, June through September, the three principal taxa, Chironomidae, Hydropsychidae and Ephemeroptera all increased in the drift samples with neither group dominating during the period. The total benthic biomass also increased during the summer. Little similarity was observed in the taxonomic composition of the drift and benthic communities, with a much greater diversity of organisms found in the drift. The main factors affecting the quality and quantity of the drift fauna were temperature and its effect upon metabolism, life cycle of the insects, and time and rates of water discharge at the Gavins Point Dam. (Jones-Wisconsin)
W74-11160

A COMPARISON OF THE MACROINVERTEBRATE AUFWACHS IN THE UNSTABILIZED AND STABILIZED MISSOURI RIVER,
South Dakota Univ., Vermillion. Dept. of Biology.
A. E. Nord, and J. C. Schmulbach.
Proceedings South Dakota Academy of Science, Vol 52, p 127-139, 1973. 4 tab, 23 ref. OWRR B-024-SDAK(3).

Descriptors: *Periphyton, *Invertebrates, Missouri River, Channel morphology, Systematics, Standing crops, Mayflies, Diptera, Caddisflies, Aquatic insects, Lentic environment, Lotic environment, Benthic fauna.
Identifiers: Trichoptera, Simulium.

Taxonomic composition and standing crop of aufwuchs (all organisms except macrophytes which live attached to substrate) and differences between aufwuchs in stabilized and unchannelized portions of the Missouri River were determined. The samplers used to collect organisms consisted of 'masonite' plates bolted together with spacers so that 9.29 sq dia of substrate was provided for aufwuchs colonization. Samplers were suspended approximately 60 cm below the water's surface for 32 days. All organisms were identified to the lowest possible taxon, usually the generic level. Statistical analyses were accomplished with the aid of an IBM computer using a multivariate analysis program. The basic taxonomic composition of the aufwuchs varied only slightly between stations. The caddisflies, Hydropsyche and Neureclipsis, dominated the aufwuchs on both a standing crop and numerical basis. There were striking differences between fast- and slow-water samplers at each station: slow-water samplers had greater species diversity while fast-water samplers had larger standing crops. Aufwuchs preferring fast-water velocities were Hydropsyche, Baetis, Heptagenia, and Simulium. Slow-water was preferred by Neureclipsis and one or more genera of Caenidae. The unchannelized Missouri River with its diverse habitat types is a better producer of macroinvertebrates than the channelized portion. (Jones-Wisconsin)
W74-11161

A METHOD FOR RAPID IDENTIFICATION OF TYPHOID AND DYSENTERY BACTERIA IN WATER,
Institute of General and Municipal Hygiene, Moscow (USSR).
M. G. Kichenko, and Y. G. Talayeva.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-773 902, $4.00 in paper copy, $2.25 in microfiche. Translated from Akademiya Meditsinskikh nauk USSR, Voprosy Sanitarnoy Bakteriologii i Virusologii, p 166-170, 1965. Air Force Systems Command, Translation Division, FTD-HT-23-519-74, January 1974. 9 p.

Descriptors: *Pathogenic bacteria, *Water analysis, *Analytical techniques, Bioassay, Enteric bacteria, Coliforms, Cultures, Systematics.
Identifiers: Typhoid, Dysentery.

Use of fluorescent sera for early rapid diagnosis of pathogenic coliform bacteria gave good results with pure cultures, but not with mixed cultures. This method is promising only with organisms with a clearly defined antigen structure (Vibrio cholerae, plague bacilli, anthrax bacilli and other dangerous causative agents). However, pathogens of the enterobacteriaceae family are similar in their antigenic nature to various saprophytic bacteria thus fluorescent sera can be of limited use as a rapid method for determining pathogenic bacteria. A combination of methods for shortening bacteriological water analysis give results in 18 hours. In addition to direct methods for isolating pathogens from water, indirect methods in an external medium are being used based on different bacterial properties or chemical composition. Thus, precipitation reaction with hapten in a mixed culture is based on the multisugar complex of pathogens to give a precipitative reaction with specific sera. As an indirect index of infectiosness, use of the ability of a specific (indicating) bacteriophage to multiply only in cells of the corresponding group of pathogens is proposed. These direct methods do not preclude the need for further development of rapid bacteriological methods for direct isolation of pathogenic bacteria. (Jones-Wisconsin)
W74-11162

BIOGEOCHEMISTRY OF A RESERVOIR ECOSYSTEM,
Oklahoma State Univ., Stillwater. Dept. of Chemistry; Oklahoma State Univ., Stillwater. Dept. of Zoology; and Oklahoma State Univ., Stillwater. Reservoir Research Center.
L. P. Varga, D. W. Toetz, and T. C. Dorris.
Available from the National Technical Information Service, Springfield, Va 22161. $4.25 in paper copy, $2.25 in microfiche. Report No 4, September 1, 1972 to June 1, 1973. (ORO-4254-14). 41 p, 5 fig, 15 tab, 15 ref. AEC AT-(40-1)-4254.

Descriptors: *Nitrogen, *Nitrates, *Absorption, *Diurnal, Mathematical models, Analytical techniques, Temperature, Measurement, Oklahoma, Phosphorus, Carbon, Chlorophyta, Chlorella, Cyanophyta, Carbon dioxide, Spectrometers, Phenols, Solar radiation, Biochemistry, Geochemistry.
Identifiers: *Lake Carl Blackwell(OK).

A computation model to predict uptake of nitrate given data on substrate concentration, light, temperature, and cellular nitrogen was developed and evaluated by comparing observed and predicted uptake in Lake Carl Blackwell, Oklahoma. Diel periodicity in nitrogen deficiency was not detected. Nitrite uptake by plankton was observed over a diel period in situ. Nitrite was assimilated both in the dark and the light, but the dark rate was lower by a factor of two. Observations were completed on precision of an in situ method to derive Michaelis-Menten constants for nitrate uptake. Nitrogen, phosphorus, and organic carbon additions, and aeration were applied to water isolated in polyethylene columns. Aeration in columns did not significantly reduce algal numbers. Sedimentary phosphorus was released by stirring and increased algal growth. A laboratory experiment demonstrated which forms of algae overwintered in the sediments. A green and a blue-green alga were monitored simultaneously in laboratory cultures under conditions of low pH, bubbled carbon dioxide, and added nitrogen and phosphorus to evaluate their competitive ad-

vantage. Both species grew at the same rate in filtered lake water and in filtered water with nutrients added. (Jones-Wisconsin)
W74-11164

OIL POLLUTION AND MARINE ECOLOGY,
University Coll. of Swansea (Wales). Dept. of Zoology.
A. Nelson-Smith.
Plenum Press, New York, 1973. 260 p, 52 fig, 20 tab, 694 ref.

Descriptors: *Oil pollution, *Marine biology, *Ecology, Water pollution effects, Ships, Pollutants, Toxicity, International waters, Harbors, Physical properties, Chemical properties, Oil spills, Plankton, Fish, Benthic fauna, Plant populations, Birds, Mammals, Biological communities, Economics, Fisheries, Tourism, Hazards, Emulsions, Dispersion, Sedimentation, Biodegradation, Water pollution sources, Shores, Oil industry, Water pollution control, Diseases.

Technical publications on oil pollution are so numerous that many environmental scientists remain ignorant of its main causes and best cures. This volume combines important features of technical and biological literature, and indicates to industrialists and administrators some complexities of life in the sea and the less direct effect pollution may have on marine ecosystems. Additional stresses imposed by pollution in the marine environment may be determining factors in eliminating localized species from fringes of their range. The usual and most obvious effect of pollution is to reduce diversity. Common pollutants are listed. The petroleum industry has grown with development of tank shipping, which with other shipping and marine terminals and harbors, contribute to oil spills. Spilt oil is examined with reference to its physical and chemical characteristics, behavior at sea, oil carried to the strandline at high-water mark, detection, identification and analysis, and carcinogenesis. Oil effects on marine organisms--plankton, fish, benthic invertebrates, attached plants, birds and mammals is presented, and its effects on populations or communities, and rehabilitation of oiled birds. Economic aspects, fisheries, tourist industry, hazards to life and property are considered. Recommended methods for removing spilt oil complete the book. (Jones-Wisconsin)
W74-11166

EVOLUTION OF THE PLANKTON BIOCENOSIS OF LAKE ANNECY, (IN FRENCH),
Institut National de la Recherche Agronomique, Thonon-les-Bains (France). Station d'Hydrobiologie Lacustre.
For primary bibliographic entry see Field 2H.
W74-11168

RELATIONS BETWEEN THE POLLUTION OF THE CORTIOU SECTOR BY ANIONIC DETERGENTS AND MODIFICATIONS IN POPULATIONS OF CYSTOSEIRA STRICTA, (IN FRENCH),
A. Arnoux, and D. Bellan-Santini.
Tethys. Vol 4, No 3, p 583-586, 1972, Illus. English summary.

Descriptors: *Detergents, Estuaries.
Identifiers: Cortiou, Cystoseira stricta, Marseilles.

A parallel is established between the evolution and the disappearance of the C. stricta community settling on hard substratum in pure water, and the amount in anionic detergents of the superficial waters at the sea-outlet of the sewer of the city of Marseilles (France).--Copyright 1974, Biological Abstracts, Inc.
W74-11174

THE EFFECT OF CUSO4 ALGICIDE DOSES UPON THE ROUTINE METABOLISM OF COMMON CARP (CYPRINUS CARPIO L.) AND PRUSSIAN CARP (CARASSIUS AURATUS GIBELIO (BLOCH)), (IN RUMANIAN),
Academia R. S. R., Bucharest. Institutul de Biologie.
E. Leonte.
Bul Cercet Piscic. Vol 31, No 1/2, p 137-144. 1972. Illus. English summary.

Descriptors: *Copper sulfate, *Algicides, Carp.
Identifiers: Carassius auratus-gibelio, Cyprinus carpio.

The effects of 0.7, 0.5, 0.3 and 0.1 mg CuSO4/1 solutions (algicide doses) on the routine metabolism of common carp (C. carpio) and prussian carp (C. auratus gibelio) were investigated. Algicide doses of CuSO4 had a lethal action on these 2 species. The responses of O2 uptake to toxic actions of CuSO4 solutions had 3 phases: an immediate response, in the first min after exposure to the toxic compound; a stabilization phase in which O2 consumption remained fairly constant; and a third phase, which was characterized by the establishment of asphyxia. Values of routine O2 consumption and duration of phases were dependent upon concentrations of CuSO4 solutions. Death occurred by asphyxia when tissues of gills were damaged and O2 requirements could not be compensated by increase of gill ventilation.--Copyright 1974, Biological Abstracts, Inc.
W74-11176

THE INFLUENCE OF THE EUTROPHIC PROCESS OF WATERS BY ERODED SOIL MATERIAL, (IN GERMAN),
H. Wiechmann.
Landwirtsch Forsch. Vol 26, No 1, p 37-46. 1973. English summary.

Descriptors: *Eutrophication, Phosphates, Suspension, Soil erosion.

In order to determine to what extent eroded soil material can increase the eutropic process of waters by P the reaction of P-dissolution and P-sorption within soil suspensions (Ap-horizons of Loess-soils) with the fractions < micro, < 6 micro and < 20 micro was tested. From total phosphate dissolved out of the suspended soil material during 2-48 hr, approximately 50-67% originate from the P-content of the clay fraction although the suspended P-reserves were almost the same in all 3 grain fractions. The maximum of the dissolved P-shares from the grain fractions was obtained after 2 hr (3-8% from the silt fractions, 11-14% from the clay fraction). Prolongation of the reaction-time only influences the P-solution rate within the silt fractions. The dissolved P-share decreases with the increase of suspended soil with same grain distribution. Concerning the eutropic process of P the phosphates of the clay fraction are of special importance because of high and rapid solubility. Water containing Ca(HCO3)2 used as means of suspension resulted in lower as well as higher P-dissolution rates compared with water, supposedly due to dependence on the binding of P (Ca-phosphate respectively Al + Fe-phosphate) and on their dissolution reactions. However, a clear relationship could not be found. In suspensions with P-containing sewage the P-sorption dominated a possible P-desorption in all tested P-concentrations. The clay fraction is of outstanding importance for the P-binding. Eroded soil material in some cases can lower the risk of eutropic processes by acting as a 'third refinement stage.'--Copyright 1974, Biological Abstracts, Inc.
W74-11207

ENVIRONMENTAL EFFECTS OF PETROCHEMICAL WASTE DISCHARGES ON TALLABOA AND GUAYANILLA BAYS, PUERTO RICO,
Environmental Protection Agency, Athens, Ga. Surveillance and Analysis Div.
M. D. Lail, R. G. Rogers, and M. R. Weldon.
Available from NTIS, Springfield, Va 22161 as PB-215 622, Price $3.00 printed copy; $2.25 microfiche. Technical Study TS-03-71-208-02, October 1971. 102 p, 21 fig, 10 tab, 28 ref, 7 append.

Descriptors: *Water pollution effects, *Bays, *Puerto Rico, Oily water, *Oil pollution, Water pollution sources, Water temperature, Eutrophication, Algae, Chemical wastes, Thermal pollution.
Identifiers: Tallaboa Bay(PR), Guayanilla Bay(PR).

Petrochemical wastes and once-through cooling water discharged into Tallaboa Bay and once-through cooling water discharged by the South Coast Steam Plant into Guayanilla Bay caused violations of Puerto Rico's water quality standards. Dissolved oxygen concentrations in western Tallaboa Bay are below the 4.5 mg/liter minimum requirement. Water temperatures in western Tallaboa Bay and eastern Guayanilla Bay are in excess of the 4 deg F rise permitted. Organic sediment deposits in Tallaboa and Guayanilla Bays contain petrochemical residues. Visible oil and floating solids contaminate western Tallaboa Bay. Standing crop and diversity of the community of macroinvertebrate organisms inhabiting Tallaboa and Guayanilla Bays are reduced. Corals are destroyed by the depositions of oil and detritus in western Tallaboa Bay. Unsightly nuisance growths of filmamentous green algae of the genera Cladophora and Enteromorpha are found along the shorelines of Tallaboa and Guayanilla Bays. (Knapp-USGS)
W74-11228

EFFECT OF WASTE MANAGEMENT AND EGG PROCESSING ON THE FLAVOR OF COOKED EGGS,
Cornell Univ., Ithaca, N.Y. Dept. of Poultry Science.
K. R. Nath, J. M. Darfler, and R. C. Baker.
Poultry Science, Vol 52, No 3, p 1178-1185, May, 1973. 3 fig, 6 tab, 9 ref.

Descriptors: *Farm wastes, *Poultry, Environment, Hydrogen sulfide, *Odor, Effects.
Identifiers: *Eggs, *Flavor, Processing, *Waste management, Cryovac bags, Egg storage, Albumen, Yolk.

Four different chambers used for handling manure were compared in a study undertaken to evaluate the effect of environmental odors on the flavor of soft cooked eggs. Soft cooked eggs were prepared by immersing eggs in boiling water for four minutes. Hard cooked eggs were prepared by heating eggs for 20 minutes in water at 93C. Some hard cooked eggs were stored in shells while other were peeled and packaged in Cryovac bags. All storage studies were done at 5C. Hen-house environment has no effect on the flavor of soft cooked eggs. In hard cooked eggs, the flavor quality of both albumen and yolk deteriorated at one week. When eggs were peeled and packaged in Cryovac bags albumen did not deteriorate as rapidly as eggs stored in shells. The loss of hydrogen sulfide from cooked eggs is responsible for the loss of egg flavor. (Cartmell-East Central)
W74-11236

EFFECT OF CATTLE FEEDLOT VOLATILES, ALIPHATIC AMINES, ON CHLORELLA ELLIPSOIDEA GROWTH,
Agricultural Research Service, Fort Collins, Colo.
A. R. Mosier.
Journal of Environmental Quality, Vol 3, No 1, p 26-28, January-March, 1974. 1 fig, 3 tab, 10 ref.

Descriptors: *Feed lots, *Volatility, Algae, Toxicity, Nitrogen, Ammonia, Effects, *Farm wastes.
Identifiers: *Aliphatic amines, *Chlorella Ellipsoidea, Methyl, Dimethyl, Ethyl, Diethyl, N-propyl, Iso-propyl, N-butyl, Sec-butyl, Dialkylamines.

The purpose of this study was to determine the effect of individual aliphatic amines that have been identified as feedlot volatiles on chlorella ellipsoidea. The amines tested were methyl, dimethyl, ethyl, diethyl, n-propyl, iso-propyl, n-butyl, and sec-butyl. Individual aliphatic amines caused a 50% reduction in population growth of chlorella ellipsoidea at concentrations ranging from 1.2 to 143 ppm amine-N. The more closely the amine structurally resembles ammonia, the greater the inhibitory effect. The primary amines were more toxic than the sec-, iso-, or the dialkylamines. The algae could not utilize any of the amines as N sources either in the presence of adequate N or under N-deficient conditions. (Cartmell-East Central)
W74-11238

INFORMATION ON THE RECENT PRACTICE OF HYGIENIC QUALIFICATIONS OF SURFACE WATERS, (TAJEKOZTATO A FELSZINI VIZEK HIGIENES MINOSITESENEK JELENLEGI GYAKORLATAROL),
For primary bibliographic entry see Field 5G.
W74-11256

THE DISTRIBUTION AND SUCCESSION OF AQUATIC VASCULAR PLANT COMMUNITIES IN RELATION TO PHYSICAL-CHEMICAL CHARACTERISTICS OF VARIOUS LAKES AND PONDS OF THE TANANA VALLEY, CENTRAL ALASKA,
Alaska Univ., College. Inst. of Water Resources; and Alaska Univ., College. Inst. of Marine Science.
J. D. LaPerriere, and B. R. Robertson.
Termination Report, September 1973. 17 p. 1 fig, 9 tab. OWRR A-011-ALAS(1).

Descriptors: *Alaska, *Aquatic plants, *Distribution, *Succession, Physical properties, Chemical properties, Lakes, Ponds, Bottom sediments, Algae, Soil analysis, Water quality, Temperature, Oxygen, Carbon dioxide, Alkalinity, Nitrites, Sulfates, Turbidity, Hydrogen ion concentration, Phosphates, Weather, Organic matter.
Identifiers: *Tanana Valley(AK), Harding Lake(AK), Little Lake(AK).

This report consists of one figure showing the morphometry of Harding and Little Lakes in central Alaska with sampling station locations. The station characteristics are summarized in nine tables regarding the texture of bottom materials (in percentage according to depth) and organic matter content of bottom materials (percentage dry weight), according to depth and station. The species of aquatic vascular plants, algae, and liverwort, occurring in Harding Lake in the summer of 1966 are listed showing the number and dry weight of the plant collections, arranged by station. The occurrence of plant species in quadrat (1 sq m) samples are listed by number and dry weight. The soil analysis data are arranged by plant stand and by plant species. At one station the water quality parameters--temperature, oxygen, carbon dioxide, alkalinity, nitrites, sulfates, turbidity, pH, phosphates and weather--are analyzed. (Jones-Wisconsin)
W74-11282

INFLUENCE OF ORGANIC POLLUTION ON LAKE MARIUT, A HIGHLY EUTROPHICATED LAKE SOUTH OF ALEXANDRIA,
Alexandria Univ. (Egypt). Dept. of Oceanography.
M. A. H. Saad.
In: Revue Internationale d'Oceanographie Medicale, Vol 34, p 23-36, 1974. 3 fig, 1 tab, 20 ref.

Descriptors: *Water pollution effects, *Water pollution sources, *Organic wastes, *Eutrophication, Dissolved oxygen, Environmental effects, Sewage, Industrial wastes, Domestic wastes, Decomposing organic matter, Aquatic environment, Water chemistry, Hydrogen sulfide, Phytoplankton, Freshwater.
Identifiers: *Lake Mariut(Egypt).

Lake Mariut was considered a highly fertile lake until recent years. Increasing population and industry have caused intensive pollution and extreme deterioration of this lake. The decrease in the total fish catch from 9,977,815 kg in 1961 to 1,490,600 kg in 1969 is due principally to the lake pollution. Lake Mariut receives great amounts of untreated domestic sewages and industrial wastes which are enriched with allochthonous organic matter. The phytoplankton blooms, which flourish under favorable conditions, supply the lake with considerable amounts of autochthonous organic materials. Water samples were collected from five different localities of the lake and also from the Qala Drain at its connection with the lake. Concentrations of the dissolved organic matter were established. The maximum value of the organic content of Lake Mariut reached 19.80 mg O2/l in October. The environmental conditions are favorable for the decomposition of great amounts of this organic matter and result in a great decrease in the dissolved oxygen in this lake. Further decomposition of organic matter occurs anaerobically resulting in the production of decomposition gases, particularly hydrogen sulfide. Drainage waters enter the lake more or less continuously and mex-pumps discharge surplus water from the lake into the sea. The polluted lake water, rich in organic matter, may affect the Mediterranean coastal water to the north of Lake Mariut. This influence has not been studied. (Katz)
W74-11283

THE EFFECT OF POLLUTED WATER ON THE ASSIMILATION RATE OF THE BROWN ALGAE ASCOPHYLLUM NODOSUM (L.) LE JOL. AND FUCUS VESICULOSUS (L.) (PRELIMINARY EXPERIMENT),
Institut za Biologijo Sazu, Ljubljana (Yugoslavia).
I. Munda.
In: Revue Internationale d'Oceanographie Medicale, Vol 34, p 53-66, 1974. 2 fig, 1 tab, 29 ref.

Descriptors: *Salinity, *Organic wastes, *Algae, *Distribution, Littoral, Water pollution effects, *Phaeophyta, Aquatic plants, Sewage, Domestic wastes, Methodology, Oxygen, Respiration, Metabolism, Primary producers, Bioassay.
Identifiers: *Fucoids, *Fucus vesiculosus, *Ascophyllum nodosum, Oxygen production, Oxygen consumption, Assimilation rates, Chemical composition.

Studies of the polluted areas of Nordasvatnet in Western Norway revealed that the dominant eulittoral fucoids, A. nodosum and F. vesiculosus, avoid habitats polluted by sewage though salinity conditions would still permit their occurrence. Preliminary experiments studied the effects of organic pollution on the assimilation rate of F. vesiculosus and of A. nodosum, under constant salinity conditions. Polluted water from the inner area of Nordasvtnet was used as medium and the control samples were kept in unpolluted water. In another series of experiments, bacterial and plankton respiration was cut off by means of sterilization and the biggest organic particles were removed by filtration. Oxygen production was found in the control samples and oxygen consumption in the other samples. Results indicated that certain components in the sewage exert a negative influence upon the metabolic activity of the two fucoids, even after bacterial activity had been terminated. F. vesiculosus seems more susceptible than A. nodosum. The results of the preliminary experiments apparently contradict the spatial distribution of the two species in polluted areas, where F. vesiculosus protrudes longer in the neighborhood of sewers than A. nodosum. The distribution in the field seems salinity-conditioned and is in accord with the greater resistance of F. vesiculosus towards dilution. It seems probable that in the vicinity of sewers the influences of organic pollution prevail over the influence of the salinity factor. (Katz)
W74-11284

SOME RESPONSES OF PLANKTONIC ORGANISMS TO ENVIRONMENTAL POLLUTION,
Messina Univ. (Italy). Inst. of Hygiene.
P. Crisafi.
In: Revue Internationale d'Oceanographie Medicale, Vol 34, p 145-154, 1974. 10 fig, 17 ref.

Descriptors: *Copepods, *Water pollution effects, Invertebrates, Zooplankton, Crustaceans, Plankton, Aquatic animals, Organic compounds, Microscopy, Environmental effects, Pathology.
Identifiers: *Morphological changes, *Intestinal prolapse, Acartia ssp, Centropages ssp, Temora ssp, Paracalanus ssp, Italy, Histology.

Morphological deviations of marine and freshwater Copepods of a previously unreported nature are believed to be caused by unfit nutrients such as hydrocarbons or pabulum. These result from environmental changes. Histological investigations show this to be an intestinal prolapse. The muff-shaped appendage on anal segments was found on female Acartia discaudata var. mediterranea, Acartia italica, A. clausi, Centropages humatus, Paracalanus ssp. and both sexes of Temora longicornis. The development of the appendage takes place gradually as evidenced by individual differences and lack of the appendage in some specimens. (Katz)
W74-11285

CHANGES AND SUCCESSION IN THE BENTHIC ALGAL ASSOCIATIONS OF SLIGHTLY POLLUTED HABITATS,
Institut za Biologijo Sazu, Ljubljana (Yugoslavia).
I. Munda.
In: Revue Internationale d'Oceanographie Medicale, Vol 34, p 37-52, 1974. 22 ref.

Descriptors: *Algae, *Benthic flora, *Water pollution effects, *Succession, Benthos, Environmental effects, Organic wastes, Vegetation establishment, Biomass, Primary productivity, Hydrography, Ecology, Salinity, Fjords.
Identifiers: *Fucus ssp, *Adriatic, Green algae, Vegetation pattern, Norway, Blidingia ssp, Pelvetia ssp, Asophyllum ssp, Halopteris ssp.

The effect of sewage on benthic algal associations was investigated in two hydrographically different areas, a land-locked fjord in Western Norway and in the surroundings of Rovinj in the Northern Adriatic. Observations indicated that the fucoids gradually disappear under the influence of sewage in both areas. In the Atlantic, however, they disappear in the following sequence: Pelvetia canaliculata, Fucus spiralis, Fucus serratus, Asophyllum nodosum, Fucus vesiculosus. They are replaced by associations of different Enteromorpha species, which seem to be prolific under the influence of slight organic pollution. In the immediate neighborhood of sewers a Blidingia minima Cyanophyceae association was left. In the Adriatic, fucoids seemed likewise to disappear from areas polluted by sewage. The Cystoseira and Sargassum associations seemed to be rather susceptible and the Fucus virsoides association less. The associations are replaced by Halopteris scoparia, which seems to represent the final stage of succession under conditions of slight organic pollution in the Adriatic, while green algae have a subordinate role in the vegetation pattern. Observations in both regions indicated that the biomass of the benthic algal settlements have decreased under the influence of organic pollution. (Katz)
W74-11286

USE OF NERITIC TROPHODYNAMIC CHAIN OF MOLLUSCS FOR THE STUDY OF THE TRANSFER OF METALLIC POLLUTANTS, (UTILISATION D'UNE CHAINE TROPHODYNAMIQUE DE TYPE NERITIQUE A MOLLUSQUES POUR L'ETUDE DES TRANSFERTS DES POLLUANTS METALLIQUES),
Centre d'Etudes et de Recherches de Biologie et d'Oceanographie Medicale, Nice (France).

M. Aubert, R. Bittel, F. Laumond, M. Romeo, and B. Donnier.
In: Revue Internationale d'Oceanographie Medicale, Vol 33, p 7-30, 1974. 6 tab, 36 ref.

Descriptors: *Path of pollutants, *Heavy metals, *Molluscs, *Food chains, Industrial wastes, Water pollution sources, Water pollution effects, Trophic, Copper, Chromium, Zinc, Lead, Mercury, Organic compounds, Ions, Bioassay, Public health, Absorption, Neritic, Effluents, Estuaries, Benthos, Analytical techniques, Methodology, Plankton, Toxicity, Laboratory tests.
Identifiers: *Biological chains, *Accumulation.

Industrial metallic by-products are disposed into the marine environment, thus, they can lead to phenomena of concentration in oceanic organisms and further on to phenomena of toxicity for the final consumer of the biological chains. Results of experiments, carried out in the laboratory, with regard to the transfers of metallic pollutants within a neritic chain with molluscs are discussed. Five metals are taken into consideration with values given for their average concentrations in various organisms. They are copper, zinc, chromium, lead, and mercury, in an ionic form or associated with organic compounds, found in effluents and in oceanic environments. The results are discussed to assess the hazards of pollution presented by activation and chemical products. (Katz)
W74-11287

TRACE METALS IN SEDIMENTS AND BIVALVE MOLLUSCA IN SOUTHAMPTON WATER AND THE SOLENT,
General Electricity Generating Board, Fawley, Southampton (England). Marine Biological Lab.
For primary bibliographic entry see Field 5B.
W74-11288

CONTAMINATION OF MARINE TROPHIC CHAINS BY COBALT 60 (CONSUMPTION OF CONTAMINATED ARENICOLAE BY PLAICE AND CRABS), (CONTAMINATION DE CHAINES TROPHIQUES MARINES PAR LE COBALT 60 (CONSOMMATION D'ARENICOLES CONTAMINEES PAR DES PLIES ET DES CRABES)),
Commissariat a l'Energie Atomique Fontenacy-aux-Roses (France).
C. Amiard-Triquet, and J. C. Amiard.
In: Revue Internationale d'Oceanographie Medicale, Vol 33, p 49-59, 1974. 3 fig, 3 tab, 13 ref.

Descriptors: *Cobalt, *Cobalt radioisotopes, *Path of pollutants, Metals, Annelids, Trophic level, Crustaceans, Teleosts, Crabs, Radioisotopes, Monitoring, Absorption isotope studies, Analytical techniques, Animal physiology, Nuclear power plants, Laboratory tests, Food chains, Public health, Bioassay.
Identifiers: Plaice, Assimilation, Carcinus maenas, Pleuronectes platessa, Hepatopancreas, Liver, Kidney.

A study was made of the passage of 60Co from the Annelid Arenicola marina to the upper trophic level constituted by the Crustacea Carcinus maenas or the Teleost Pleuronectes platessa. The absorption and the fecal, urinary and branchial excretions of 60Co were measured following the administration of contaminated food during periods from one to five months. The elimination of 60Co by crabs and plaice was monitored during six and three months respectively. Assimilation of radioactive and stable cobalt found as a carrier in the contaminated food varied according to the species; assimilation rates were high in C. maenas and very low in P. platessa. Cobalt isotopes were mainly retained in the hepatopancreas of crabs and in the liver and kidney of plaice. The high concentrations of 60Co in these organs could result in very high but partial internal exposures. They are long-term exposures since cobalt seems to be retained in an unexchangeable form. (Katz)
W74-11289

TYPICAL LEVEL OF LEAD IN MYTILUS GALLOPROVINCIALIS LMK FROM THE GULF OF TRIESTE,
Trieste Univ. (Italy).
For primary bibliographic entry see Field 5B.
W74-11290

LONG-TERM ANNUAL FLUCTUATIONS OF MERCURY IN THE ZOOPLANKTON OF THE EAST CENTRAL ADRIATIC,
Split Inst. of Oceanography and Fisheries, (Yugoslavia).
For primary bibliographic entry see Field 5B.
W74-11291

THE SUBLETHAL EFFECTS OF ENVIRONMENTAL VARIABLES ON POLYCHAETOUS ANNELIDS,
California State Univ., Long Beach. Dept. of Biology.
D. J. Reish.
In: Revue Internationale d'Oceanographie Medicale, Vol 33, p 83-90, 1974. 1 fig, 11 ref.

Descriptors: *Dissolved oxygen, *Metabolism, *Annelids, Analytical techniques, Methodology, Animal physiology, Respiration, Bioassay, Bioindicators, Water pollution effects, Reproduction, Analytical techniques, Biochemical oxygen demand, Oxygen, Water pollution, Biochemistry, Amino acids, Enzymes.
Identifiers: *Sublethal effects, *Survival, *Polychaetes, Neanthes arenaceodentata, MDH/LDH, Feeding, Egg production, Hemoglobin.

The effects of reduced levels of dissolved oxygen were measured on a laboratory inbred strain of the polychaete Neanthes arenaceodentata. The 28 day TLm value was 0.9 mg/1; 0.95 mg/1 was necessary to enable 50% of the animals to feed, 2.0 mg/1 was required in order to produce 50% of the normal number of eggs, and changes in the MDH/LDH, free amino acid concentrations, and hemoglobin concentration were induced at dissolved oxygen levels of 2.6, 2.7 and 4.2 mg/1, respectively. (Katz)
W74-11292

SUBLETHAL EFFECTS OF DDT ON THE BEHAVIORAL RESPONSES OF BARNACLES TO CHEMICAL AND TACTILE STIMULI,
North Carolina Univ., Morehead City. Inst. of Marine Sciences.
N. Meith-Avcin.
In: Revue Internationale d'Oceanographie Medicale, Vol 33, p 91-102, 1974. 3 fig, 23 ref.

Descriptors: *DDT, *Behavior, Water pollution effects, Biochemistry, Animal physiology, Pesticides, Larvae, Animal behavior, Methodology.
Identifiers: *Balanus ssp, *Barnacles, *Response patterns, Sublethal levels, Tactile stimuli, Chemical stimuli, Rugophilic, Nervous system, Abnormal behavior.

Barnacles of the species Balanus amphitrite were treated with sublethal levels of DDT to determine changes in their response patterns to chemical and tactile stimuli brought by DDT action to the nervous system. At treatment exposures of 10 micrograms/l for one hour, severe behavioral anomalies were observed. Lower concentrations resulted in fewer instances of anomalous behavior. Water flow induced return to normal behavior patterns in many treated individuals, suggesting that sensory rather than motor components of the nervous system are involved in the DDT effect. Treatment of glass settling with DDT generally resulted in lowered settlement densities of the cyprids of Balanus improvisus and lowered indices of preference for roughened surfaces, indicating that DDT interferes with the cyprid's rugophilic response pattern to settlement surfaces. (Katz)
W74-11293

FREE AMINO ACID VARIATIONS IN THE ANCHOVY, ENGRAULIS MORDAX (GIRARD) FROM THE LOS ANGELES COASTAL AREA,
Immaculate Heart Coll., Los Angeles, Calif. Dept. of Biology.
R. D. Schafer, and E. Swann.
In: Revue Internationale d'Oceanographie Medicale, Vol 33, p 103-110, 1974. 1 tab, 6 ref.

Descriptors: *Amino acids, *Metabolism, Biochemistry, Water pollution effects, Organic compounds, Methodology, Commercial fish, Animal physiology, Bioassay, *California.
Identifiers: *Engraulis mordax, Auto-analyser, Histidine, *Los Angeles coast(CA).

Difference in free amino-acid content in anchovies was examined to determine the affects of water pollution. Specimens from non-polluted and polluted water were collected by net. White muscle tissue was used for analyses with an auto-analyser and both qualitative and quantitative differences in amino-acid content were noted. Aspartic acid, asparagine and cystine were not present in the controls but were found in one or more of the samples from polluted waters. Histidine was present in the controls in greater quantity than in the test samples. Other quantitative differences were found in taurine, lysine and glutamic acid. (Katz)
W74-11294

THE EFFECT OF HEAVY METAL ON PROTEIN SYNTHESIS IN CRUSTACEANS AND FISH,
Palermo Univ. (Italy). Instituto di Istologia ed Embriologia.
V. D'Amelio, G. Russo, and D. Ferraro.
In: Revue Internationale d'Oceanographie Medicale, Vol 33, p 111-118, 1974. 3 fig, 13 ref.

Descriptors: *Crustaceans, *Proteins, *Lead, *Heavy metals, Aquatic animals, Water pollution effects, Separation techniques, Analytical techniques, Methodology, Biochemistry, Cytological studies, Metabolism, Isotopic studies.
Identifiers: *Carassius auratus, *Hemoglobin synthesis, *Eriphia spinifrons, *Ribosomes, Hepatopancreas, Aminolevilinic acid dehydrase.

Treatment of Carassius auratus with lead has been found to influence three parameters of blood cells. Hemoglobin synthesis is strongly inhibited, aminolevilinic acid dehydrase activity is reduced and cell density is affected by lead. Eriphia spinifrons was treated with lead and the hepatopancreas was examined for activity and presence of polyribosomes in protein synthesis. After 30 days in the presence of 0.3 mg/l of lead nitrate, polyribosomes were lacking indicating a reduction of protein synthesis. (Katz)
W74-11295

EFFECTS ON HEPATOCYTES IN CELL CULTURES AT VARIOUS COMBINATIONS OF HEAVY METALS PRESENT IN TITANIUM WASTE WATERS, (ACTION SUR DES HEPATOCYTES EN CULTURE HISTIOTYPIQUE, DE DIVERS COMPOSES METALLIQUES PRESENTS DANS LES EAUX RESIDUAIRES DE L'INDUSTRIES DU TITANE),
Paris-5 Univ. (France). Institut d'Histochimie Medicale.
J. Verne, E. Fournier, M. Aubert, S. Hebert, and N. Richshoffer.
In: Revue Internationale d'Oceanographie Medicale, Vol 33, p 147-150, 1974. 2 ref.

Descriptors: *Metals, *Cytological studies, Cadmium, Chromium, *Titanium, *Toxicity, Enzymes, Manganese, Water pollution effects.
Identifiers: Vanadium, Hepatocytes, Mitosis, Cell culture, Titanium industry.

A study was conducted of the behavior of cellular elements in a culture which contained cadmium,

chromium, manganese, titanium and vanadium as chlorides. The cell cultures were made up of hepatocytes. Toxicity was determined using the mitotic index, the aspect of the cellular organelles and the enzymic response. The tests evidenced that cadmium was by far the most toxic metal. Both vanadium and titanium induced significant damage, while the action of manganese and chromium seemed to be very mild. (Katz)
W74-11296

THE USE OF A MOBILE LABORATORY TO STUDY TEMPERATURE RESPONSE OF FISH,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology; and Virginia Polytechnic Inst. and State Univ., Blacksburg. Center for Environmental Studies.
D. S. Cherry, K. L. Dickson, and J. Cairns, Jr.
Paper presented at the 29th Purdue Indust. Conf. May 7-9, 1974. Purdue Univ. Purdue University Engineering Bull. 1 fig, 3 tab, 22 ref.

Descriptors: *On site laboratories, On site investigations, *On site tests, Water quality control, Temperature, *Thermal pollution, Cooling water, Analytical techniques, Methodology, Movement, Rainbow trout, Sunfishes, Bass, Catfishes.
Identifiers: *Acclimation, Salmo gairdneri, Preference, Avoidance, Big-mouth chub, Smallmouth bass, Northern hogsucker.

The biological assessment of industrial waste discharges under partly controlled conditions at the discharge site is becoming increasingly important in water quality control. Temperature preference and avoidance trials were conducted with 16 fish species from six families ranging from salmonids to catfish. Fish were collected near the laboratory from heated and unheated areas near the junction of two rivers receiving thermal effluent from a fossil fuel power plant. Trials were conducted for fish acclimated at temperatures from 30 to 12C at 3C increments. Preference temperatures decreased for all species as acclimation temperature decreased. Bass, catfish and sunfish preferred the warmest temperatures while trout preferred the lowest temperatures. Species that were eurythermal were catfish and sunfish while salmonids were stenothermal. (Katz)
W74-11297

INVESTIGATIONS ON THE TOXICITY OF SEA WATER-EXTRACTS OF THREE CRUDE OILS ON EGGS OF COD (GADUS MORHUA L.),
Kiel Univ. (West Germany). Institut fuer Meereskunde.
W. W. Kuhnhold.
Berichte der Deutschen Wissenschaftlichen Kommission fur Meeresforschung, Vol 23, No 2, p 165-180, 1974. 6 fig, 5 tab, 22 ref.

Descriptors: *Toxicity, *Oil, *Embryonic growth stage, Growth stages, Larvae, Mortality, Lethal limit, Organic compounds, Methodology, Sea water, Water pollution effects.
Identifiers: *Eggs, *Gadus morhua, *Cod, *Crude oil, Water-soluble fractions, Embryonic development, Venezuela crude, Iran crude, Libya crude.

The influence of the water-soluble fractions of three crude oils to the embryogenesis was tested. Different mortality rates resulted from continuous and short-term exposures. The water soluble fraction was extracted from 2.5, 25 and 250 ml of oil by 25 l seawater, resulting in concentrations of 0.015 to 3.5 ppm of total hydrocarbon. The 48 hour LC50 and 96 hour LC50 were in the order of 1 to 12 ppm. The broadest spectrum of embryonic abnormalities was observed after exposure of the gastrula stage. The role of distorted, non-viable larvae was high in certain experiments after treatment of eggs with crude oils. (Katz)
W74-11298

THE ACCUMULATION AND RETENTION OF 65ZN AND 54MN BY THE PLAICE, PLEURONECTES PLATESSA L.,
Ministry of Agriculture, Fisheries and Food, Lowestoft (England). Fisheries Radiobiological Lab.
R. J. Pentreath.
Journal of Experimental Marine Biology, Vol 12, No 1, p 1-18, 1973. 5 fig, 9 tab, 25 ref.

Descriptors: *Zinc, *Manganese, *Radioisotopes, Absorption, Retention, Bioassay, Heavy metals, Toxicity, Trophic level, Path of pollutants, Metabolism, Trace elements, Pollutants, Radioactive wastes, Teleosts, Methodology, Water pollution effects.
Identifiers: *Pleuronectes platessa, *Plaice, Biological half-time, Tissue analysis, Blood plasma.

Studies of the uptake and loss of 65Zn and 54Mn by plaice have shown that direct accumulation from water plays only a minor role relative to food in the metabolism of these metals. Accumulation of both isotopes from water was followed at tissue level and their levels of accumulation were related to stable element concentrations. Biological half-times were also calculated for accumulation and loss to water, for loss of activity following an intraperitoneal injection and, using calculations of feeding rate and assimilation of the isotopes, from food. Some comparative studies were carried out with fed and starved fish. Due to the relatively minor role of direct accumulation from water it was considered that the concentrations of these metals would decrease at this trophic level. The relevance of such observations to toxicity testing is also discussed. (See also W74-11300) (Katz)
W74-11299

THE ACCUMULATION AND RETENTION OF 59FE AND 58CO BY THE PLAICE, PLEURONECTES PLATESSA L.,
Ministry of Agriculture, Fisheries and Food, Lowestoft (England). Fisheries Radiobiological Lab.
R. J. Pentreath.
Journal of Experimental Marine Biology, Vol 12, No 3, p 315-326, 1973. 5 fig, 5 tab, 23 ref.

Descriptors: *Iron, *Cobalt, *Radioisotopes, Absorption, Retention, Heavy metals, Pollutants, Trophic level, Bioassay.
Identifiers: *Plaice, *Pleuronectes platessa, Starvation, Biological half-times.

The accumulation of 59Fe and 58Co from water by plaice has been studied in tissues, and these levels of accumulation related to stable element concentrations. The retention of both radionuclides from labelled Nereis and labelled pellets has also been examined, and the loss of activity from intraperitoneal injections followed over a three month period. Biological half-times of the exchange with water have been calculated for many organs, although the rate of accumulation for some tissues could only be expressed as a linear function; however, for both radionuclides the direct accumulation from water resulted in concentration factors of less than 1% of the values inferred from the stable element data. The relevance of such observations to heavy metal pollution at the higher trophic levels is discussed. (See also W74-11299) (Katz)
W74-11300

THE INFLUENCE OF CERTAIN TOXIC SUBSTANCES, CONTAINED IN DOMESTIC WASTES, ON THE BACTERIA ESCHERICHIA COLI AND PSEUDOMONAS FLOURESCENS, (L'INFLUENCE DE CERTAINES SUBSTANCES TOXIQUES, CONTENUES DANS LES EAUX D'EGOUTS MUNICIPAUX, SUR LES BACTERIES ESCHERICHIA COLI ET PSEUDOMONAS FLOURESCENS),
Institute of Municipal Economy, Poznan (Poland).
S. Spandowska, B. Lubienska, and S. Kolaczkowski.
Swiss Journal of Hydrology, No 2, p 278-285, 1973. 2 fig, 3 tab, 18 ref.

Descriptors: *Municipal wastes, *Escherichia coli, *Pseudomonas, *Toxicity, Waste water(Pollution), Water pollution, Water pollution sources, Water pollution effects, Lethal limit, Growth rates, Phenols, Reproduction, Metabolism, Respiration, Methodology.
Identifiers: Aniline, Pyridine, Chrome.

The toxic influence of phenol, aniline, pyridine and chrome, substances often found in municipal wastewaters, on the bacteria E. coli and P. flourescens was examined. The non-toxic, growth limiting, toxic and lethal doses were determined on the basis of observations made of E. coli and P. flourescens reproduction and respiration patterns. Comparative test series were set up with the various doses in different nutrient cultures to ascertain whether the bacterias' multiplication process or carbohydrate decomposition was more sensitive to the chemicals. (Katz)
W74-11301

EFFECTS OF HEATED EFFLUENT ON HERMATYPIC CORALS AT KAHE POINT, OAHU,
Hawaii Institute of Marine Biology, Honolulu.
P. L. Jokiel, and S. L. Coles.
Pacific Science, Vol 28, No 1, p 1-18, 1974. 10 fig, 4 tab, 23 ref.

Descriptors: *Heated water, *Thermal pollution, *Coral, Benthic fauna, Invertebrates, Marine animals, Reefs, *Hawaii, Power plants, Mortality, Pigments, Discharge(Water), Turbidity, Water pollution sources, Water pollution effects, Benthos, Analytical techniques, Spectrophotometry.
Identifiers: *Hermatypic coral, Pocillopora ssp, Porites ssp.

The effect of thermal enrichment on hermatypic corals was investigated at Kahe Point, Oahu, Hawaii. The reef off the Kahe Power Plant was surveyed before and after an increase in thermal discharge that accompanied plant expansion. Abundances of dead and damaged corals correlated strongly with proximity to plant discharge and with levels of thermal enrichment. Nearly all corals in water 4 degrees to 5 degrees C above ambient were dead. In areas characterized by temperature increases from 2 degrees to 4 degrees C, the corals lost zooxanthellar pigment and suffered high mortality rates. Damage to the corals was most severe in late summer, and conicided with annual ambient temperature maxima. During the winter months the surviving corals slowly regained zooxanthellar pigment, but there was high mortality of corals during the recovery period. (Katz)
W74-11303

THE ACCUMULATION FROM SEA WATER OF 65ZN, 54MN, 58CO AND 59FE BY THE THORNBACK RAY, RAJA CLAVATA L.,
Ministry of Agriculture, Fisheries and Food, Lowestoft (England). Fisheries Radiobiological Lab.
R. J. Pentreath.
Journal of Experimental Marine Biology, Vol 12, No 3, p 327-334, 1973. 3 fig, 5 tab, 13 ref.

Descriptors: *Zinc, *Manganese, *Iron, *Cobalt, Absorption, Heavy metals, Radioisotopes, Permeability, Sea water, Teleosts, Bioassay, Path of pollutants, Water pollution effects.
Identifiers: *Raja clavata, *Pleuronectes platessa, *Rays(Thornback), Accumulation, Blood plasma, Organ analysis.

The accumulation of 65Zn and 54Mn from water by the thornback ray, R. clavata L., has been studied at tissue level and their levels of accumulation have been related to stable element concentra-

tions. The accumulation of 58Co and 59Fe has also been studied on a whole body basis and comparisons have been made of the 59Fe levels in the tissues after 84 days with those of the stable element. Lower values of accumulation of the radionuclides were obtained than in the case of the teleost Pleuronectesplatessa. Such differences are discussed in relation to the relative permeabilities of the two species to sea water and the relative ratios of the radionuclides from sea water to blood plasma, and of blood plasma to organ. It is concluded that for both species direct input from water plays only a minor role in the accumulation of the four radionuclides studied. (Katz)
W74-11304

EFFECT OF THERMAL EFFLUENT ON MIGRATING MENHADEN,
National Marine Fisheries Service, Highlands, N.J. Sandy Hook Lab.
J. S. Young, and C. I. Gibson.
Marine Water Pollution Bulletin, Vol 4, No 6, p 94-96, 1973. 12 ref.

Descriptors: *Thermal pollution, Water pollution sources, Water pollution effects, Fishkill, Commercial fishing, Cooling water, Heated water, Waste water(Pollution), Migration, *New York, On-site investigations.
Identifiers: *Long Island Sound, *Menhaden, Scubu observation.

Hot water effluent from power stations kill juvenile menhaden migrating through Long Island Sound. Since the fish sink to the bottom, losses are unrecorded or underestimated. Menhaden in Long Island Sound contribute to the commercial fishery off the eastern seaboard of the United States. At present, the losses are small in comparison to the total number of fish migrating through the Sound. In the future, the increasing use of the Sound and other coastal and estuarine waters may have serious consequences for fisheries. (Katz)
W74-11305

MARINE INTERTIDAL COMMUNITY RESPONSES TO KRAFT PULP MILL EFFLUENT,
British Columbia Univ., Vancouver. Dept. of Zoology.
J. R. E. Harger, and M. D. Nassichuk.
Water, Air, and Soil Pollution, Vol 3, No 1, p 107-122, 1974. 4 fig, 4 tab, 22 ref.

Descriptors: *Pulp wastes, *Intertidal areas, *Canada, Industrial wastes, Water pollution sources, Organic wastes, Sessile algae, Aquatic life, Biological communities, Laboratory tests, Diatoms, Benthos, Analytical techniques, Water pollution effects, Water analysis, Water chemistry, Temperature, Hydrogen ion concentration, Mussels, Dissolved oxygen, Trophic level, Littoral.
Identifiers: Mytilus edulis, British Columbia, Balanus ssp, Barnacles.

An attempt was made to evaluate the effects of effluent from a British Columbia kraft pulp mill on sessile marine community structure. Physical oceanographic data coupled with qualitative and quantitative considerations of the intertidal area were evaluated with respect to the implied effects on community structure and diversity. Experiments involved development of diatom communities on glass slides and the subsequent transfer of such communities to and from polluted zones. Changes in experimental community structure occurring as the result of such manipulation were then compared with control communities. The hypothesis of pulp mill effluent having no effect on community structure was rejected. (Katz)
W74-11306

TOXICITY BIOASSAYS OF CADMIUM ON SELECTED FRESHWATER INVERTEBRATES AND THE INTERACTION OF CADMIUM AND ZINC ON THE FRESHWATER SHRIMP, PARATYA TASMANIENSIS RIEK,
Adelaide Univ. (Australia). Dept. of Zoology.
V. J. Thorp, and P. S. Lake.
Australian Journal of Marine and Freshwater Research, Vol 25, No 1, p 97-104, 1974. 2 fig, 3 tab, 23 ref.

Descriptors: *Zinc, *Cadmium, *Toxicity, *Shrimp, Bioassay, Invertebrates, Freshwater, Aquatic animals, Analytical techniques, Laboratory tests, Heavy metals, Lethal limit, Water pollution effects, *Australia, Mine wastes.
Identifiers: South Esk River(Australia), Paratya tasmaniensis, Austrochiltonia subtenius, Atalophlebia australis, Ischnura heterosticta, Leptoceridae ssp.

In acute toxicity bioassays with cadmium sulphate at 15C in soft water, the concentrations fatal to 50% of the test animals were determined for five freshwater invertebrate species. The 96 hr median lethal concentration (LC50) of cadmium was 0.04 mg/l for the amphipod Austrochiltonia subtenuis, 0.06 mg/l for the shrimp Paratya tasmaniensis, 0.84 mg/l for the ephemeropteran nymph Atalophlebia australis, 250 mg/l for the zygopteran nymph Ischnura heterosticta and well over 2000 mg/l for a trichopteran larva of the Leptoceridae. The bioassays on Paratya indicated that there may be seasonal differences in sensitivity to cadmium. The 96 h LC50 for zinc for Paratya was 1.21 mg/l. Zinc and cadmium appeared to interact less than additively at concentrations below 1 toxic unit. Above this concentration, their interaction was strictly additive. (Katz)
W74-11307

SHORT TERM FATE OF DIETARY DIELDRIN IN THE DIGESTIVE TRACT OF JUVENILE LAKE TROUT (SALVELINUS NAMAYCUSH),
National Marine Fisheries Service, Ann Arbor, Mich. Great Lakes Fishery Lab.
D. J. Stewart, and R. A. Stein.
Bulletin of Environmental Contamination and Toxicology, Vol 11, No 6, p 563-566, 1974. 1 fig, 9 ref.

Descriptors: *Lake trout, *Dieldrin, *Digestion, Chlorinated hydrocarbon pesticides, Organic compounds, Insecticides, Animal physiology, Laboratory tests, Trout, Methodology, Gas chromatography, Bioassay.
Identifiers: *Salvelinus namaycush.

The short term fate of an oral dose of dieldrin in the digestive tract of lake trout was examined by injecting food contaminated with about 1.05 ppm of dieldrin directly into the stomach. Trout were sacrificed at intervals to determine the location of dieldrin in the gut. The decline of dieldrin in the stomach paralleled the decline in the amount of food and little or no dieldrin was found in the intestine. This indicates a rapid uptake or degradation of dieldrin in the pyloric caecal region and demonstrated, under these experimental conditions, that defacation of dieldrin is minimal. (Katz)
W74-11308

RESISTANCE AND RESPIRATORY PHYSIOLOGY OF INTERTIDAL MEIOFAUNA TO OXYGEN-DEFICIENCY,
Bordeaux Univ., Arcachon (France). Inst. of Marine Biology.
P. Lasserre, and J. Renaud-Mornant.
Netherlands Journal of Sea Research, Vol 7, p 290-302, 1973. 3 fig, 1 tab, 33 ref.

Descriptors: *Habitats, *Metabolism, *Oxygen, Lethal limit, Methodology, Oxygen requirements, Hydrogen sulfide, Animal physiology, Adaptation.
Identifiers: *Meiofauna, Hesionides ssp, Stygocapitella ssp, Protodriloides ssp, Stenoxybionic, Euroxybionic.

The resistance and oxygen consumption of six meiofauna groups living in semistable or oceanic sandy beaches were studies in relation to oxygen-deficiency. Under laboratory conditions the 6 groups examined (2 polychaetes, 1 oligochaete, 1 archiannelid, 1 mystacocarid, and 1 harpacticoid copepod) show a high sensitivity to hydrogen sulfide and an intolerance to a low ambient oxygen (below 0.5 ml O2/l). Above this critical limit they are more tolerant and different groups are considered either stenoxybiontic or euroxybiontic. A distinction between metabolic regulators and metabolic conformers is made for some species. Others have complex metabolic rates. The euroxybiontic regulators show highest tolerance to low oxygen tension which enables these species to live at a high level of the sandy beach, an oxygen deficient habitat. Stenoxybionic conformers require a fully oxidized biotope found in the 'high energy beach'. (Katz)
W74-11309

EFFECT OF WATER HARDNESS ON THE TOXICITY OF AN ANIONIC DETERGENT TO FISH,
Unilever Ltd., Sharnbrook (England). Unilever Research Lab.
P. W. A. Tovell, C. Newsome, and D. Howes.
Water Research, Vol 8, No 5, p 291-296, 1974. 5 fig, 8 ref.

Descriptors: *Toxicity, *Detergents, *Anions, *Hardness(Water), Water properties, Absorption, Cations, Trout, Rainbow trout, Isotope studies, Methodology.
Identifiers: *Sodium lauryl sulphate, Goldfish, Salmo gairdneri, Carassius auratus, Tissue uptake, Soft water, Survival times, Sodium ion, Potassium ion, Magnesium ion, Calcium ion.

The toxicity to fish of anionic detergents in solution varies according to the hardness of the water in which the fish are treated. Trout and goldfish are more susceptible to sodium lauryl sulphate (SLS) in hard water than soft, and the rate of absorption of detergent is greater in hard water. It has been shown that the concentration of bivalent cations has a direct effect on the toxicity of SLS. Acclimatization experiments have shown that the toxicity of SLS depends on both the hardness of the water in which the fish was treated and the hardness of the water in which the fish was acclimatized. The mechanism whereby water hardness affects detergent toxicity is discussed. (Katz)
W74-11310

LEAD UPTAKE FROM SEA WATER AND FOOD, AND LEAD LOSS IN THE COMMON MUSSEL MYTILUS EDULIS,
Institut fuer Meeresforschung, Bremerhaven (West Germany).
M. Schulz-Baldes.
Marine Biology, Vol 25, No 3, p 177-193, 1974. 7 fig, 4 tab, 27 ref.

Descriptors: *Mussels, *Lead, *Absorption, Molluscs, Marine animals, Bioassay, Bioindicators, Sea water, Water pollution, Metals, Heavy metals, Food chains, Methodology, Laboratory tests, Spectrophotometry, Analytical techniques, Statistical models.
Identifiers: *Mytilus edulis, *Kidney, Lead loss.

Common mussels were maintained for 6 weeks in sea water containing different concentrations of lead (0.005 to 5 mg/l). The lead concentration in the mussels' whole soft parts was analysed at different times during the experiment. A constant rate of lead uptake, linearly dependent on the lead concentration of the medium, was observed. Rate of lead loss, measured after transferring the mussels into natural sea water, is linearly dependent on the orginal lead concentration in the soft parts. Rates of uptake and loss in large mussels are less than those in small mussels. Adjustment to a steady state is expected to occur in a more ex-

tended experimental period. Lead uptake by individual organs of large M. edulis was analysed in 2 test series. Rates of uptake varied in all organs; the kidney displayed the highest rate. With these physiological properties M. edulis is an ideal indicator organism for lead pollution in the marine environment. (Katz)
W74-11311

A KEROSENE-LIKE TAINT IN THE SEA MULLET, MUGIL CEPHALUS (LINNAEUS) I. COMPOSITION AND ENVIRONMENTAL OCCURRENCE OF THE TAINTING SUBSTANCE,
Department of Primary Industries, Hamilton, (Australia). Sandy Trout Food Preservation Research Lab.
D. W. Connell.
Australian Journal of Marine and Freshwater Research, Vol 25, No 1, p 7-24, 1974. 8 fig, 24 ref.

Descriptors: *Mullets, *Absorption, Chemical analysis, Bioassay, Australia, Marine fish, Commercial fish, Sediments, Hydrocarbons, Taste, Odor, Organoleptic properties, Analytical techniques, Gas chromatography, Spectrometry, Spawning.
Identifiers: *Taint, Kerosene, Mugil cephalus.

A kerosene-like taint in sea mullet from south Queensland has been found to be due to a mixture of hydrocarbons closely resembling commercial kerosene in composition. Similar substances were isolated from sediments in certain areas of the Brisbane River and from effluents discharging into one of these areas. Hydrocarbon-containing sediments, consumed with food, were found in the gut of tainted sea mullet and are believed to cause kerosene-like tainting in the flesh. The presence of hydrocarbons in river water indicates the possibility of absorption through the gills. Tainted fish from the Brisbane River possibly join untainted fish from other rivers in the winter spawning run. This would explain the capture of tainted fish, together with untainted fish, during the winter when commercial mullet fishery is at its peak. (Katz)
W74-11312

THE COMBINED EFFECT OF HIGH SALINITY AND TEMPERATURE ON THE SURVIVAL OF YOUNG LIMANDA LIMANDA,
Leeds Univ. (England). Wellcome Marine Lab.
D. Lowthion.
Marine Biology, Vol 25, No 3, p 169-174. 4 fig, 3 tab, 16 ref.

Descriptors: *Salinity, *Temperature, *Time, Water pollution sources, Mortality, Seasonal, Statistical models, Methodology, Analytical techniques, Commercial fish, Marine fish, Larvae, Resistance.
Identifiers: *Limanda limanda, Brine, Response-surface analysis, Median survival time, *Dabs.

Young specimens of the dab, Limanda limanda (Linnaeus) in the area of a proposed concentrated brine discharge off the Yorkshire coast were subjected to high salinities over temperatures corresponding to an annual temperature range. The results of these experiments have been used in the design of a dilution and dispension system to protect the inshore fisheries. Mortality was found to be size dependent, smaller dabs being least resistant. The effect of temperature slowly declines with increased immersion time, and salinity becomes increasingly the more dominant effect. A 3-dimensional response-surface model of the mortality contours, for salinity, temperature, and immersion time, was produced which may be used to set upper limits to the design of the effluent disposal system. It is concluded that significant changes in the L. limanda populations will not occur, provided salinity does not rise above 55%. (Katz)
W74-11314

THE TOXICITY OF SOME FORMS OF COPPER TO RAINBOW TROUT,
Water Pollution Research Lab., Stevenage (England).
T. L. Shaw, and V. M. Brown.
Water Research, Vol 8, No 6, p 377-382, 1974. 1 fig, 4 tab, 10 ref, append.

Descriptors: *Copper, *Toxicity, *Rainbow trout, Trout, Hardness(Water), Copper compounds, Methodology, Lethal limit, Laboratory tests, Water pollution effects, Hydrogen ion concentration.
Identifiers: *Copper carbonate, Nitrilotriacetic acid, Organo-copper complex, pH effects, Neutralized NTA, Analytical methods, Cupric copper.

The lethal toxicity of copper to rainbow trout in hard water was found to be related to the total concentration at which soluble copper, $Cu2+$, and $CuCO3$, was present in the water, rather than to the concentration of either of these two forms alone. It is suggested that, except in the presence of highly toxic organo-copper compounds, from a knowledge of the cupric ion concentration, the pH, and the alkalinity of the water, the total concentration of soluble copper can be calculated and hence the toxicity of that water determined. (Katz)
W74-11315

DETERMINATION OF THE HEMATOCRIT VALUE OF CARP AND ITS INFLUENCING WITH COBALT, (STANOVENI HEMATODRITOVE HODNOTY KAPRU A JEJI OVLIVNENI KOBALTEM),
Vyzkumny Ustav Rybarsky and Hydrobiologicky, Vodnany (Czechoslovakia).
J. Havelka.
Zivousna Vyroba (Praha), Vol 15, No 7-8, p 489-496, 1970. 39 ref.

Descriptors: *Fish management, *Carp, *Cobalt, *Fish physiology, Fish disease, Trace elements, Analytical techniques, Methodology, Respiration, Seasonal, Fish populations, Metals, Chemcontrol.
Identifiers: *Intensive carp breeding, *Hematocrit, Cobalt dichloride, Infectious dropsy, Disease resistance, Hemoglobin, Disease prevention.

In intensive carp culture, cobalt dichloride ($CoCl2$) is added to the diet to inhibit diseases, particularly infectious dropsy. Cobalt favorably affects blood physiology, increases respiration capacity and improves disease resistance of carp. The use of the hematocrit test to evaluate carp culture procedures is advocated. (Katz)
W74-11316

ECOLOGICAL STUDIES IN ARTIFICIAL STREAMS. III. THE SEASONAL CHANGE IN THE RELATIONSHIP OF HETEROTROPH TO PHOTOTROPHIC BIOMASSES IN DIFFERENT SEWAGE CONCENTRATIONS, (OKOLOGISCHE UNTERSUCHUNGEN AN MODELLFLIESSGEWASSERN. III. DIE JAHRESZEITLICHEN VERANDERUNGEN IM VERHALTNIS VON HETEROTROPHER ZU PHOTOTROPHER BIOMASSE BET VERSCHIEDENEN ABWASSERBLASTUNGEN),
Eidgenossische Anstalt fuer Wasserversorgung, Abwasserreinigung und Gewasserschutz, Zurich (Switzerland).
E. Eichenberger.
Swiss Journal of Hydrology (Schweizerische Zeitschrift fur Hydrologie), Vol 34, No 2, p 155-172, 1972. 8 fig, 2 tab, 19 ref.

Descriptors: *Biomass, *Seasonal, Benthos, *Sewage, Chlorophyll, *Primary productivity, Productivity, Biological communities, Ecological distribution, Bacteria, Sphaerotilus, Model studies.
Identifiers: *Heterotrophs, *Phototrophs.

The seasonal changes of the biomass production of benthic microphytes were investigated in outdoor channels for the first 20 days of colonization. The channels were fed with groundwater to which up to 12% settled sewage was added as pollutant. Chlorophyll content of the total biomass allowed estimation of the heterotrophic and phototrophic portions of the total growth. Addition of 12% sewage caused an increase of the heterotrophic biomass at a constant rate for the first 3 to 4 weeks. For each season tested the heterotrophic growth is proportional to the sewage concentration within the range of 0 to 12%. Best phototrophic growth occurs in summer in 1 to 5% sewage. Heterotrophic microphytes find better conditions in winter. (See also W74-11318) (Katz)
W74-11317

ECOLOGICAL STUDIES IN ARTIFICIAL STREAMS. IV. SELF PURIFICATION AND BIOMASS PRODUCTION IN A DOMESTIC SEWAGE GRADIENT, (OKOLOGISCHE UNTERSUCHUNGEN AN MODELLELIESSGEWASSERN. IV. AUSWIRKUNG DER SELBSTEINIGUNG AUF DIE BIOMASSEBILDUNG IN EINEM ABWASSERGRADIENTEN),
Eidgenossische Anstalt fuer Wasserversorgung, Abwasserreinigung und Gewasserschutz, Zurich (Switzerland).
E. Eichenberger.
Swiss Journal of Hydrology (Schweizerische Zeitschrift fur Hydrologie), Vol 34, No 2, p 173-189, 1972. 2 fig, 5 tab, 22 ref.

Descriptors: *Benthos, *Sewage, *Biomass, *Self-purification, Primary productivity, Water pollution, Algae, Biological communities, Benthic flora, Artificial watercourses, Model studies.
Identifiers: *Phototrophs, *Heterotrophs, Nitzschia, Test streams.

The benthic growth was investigated during the first 20 days of colonization in 200 m long river models polluted with 0, 1, 5 and 12% settled domestic sewage. The productions of phototrophic and heterotrophic biomass were determined at the beginning, middle and end of the channels. An equation for the distribution of the heterotrophic biomass is described. The phototrophs do not significantly contribute to the removal of growth substrates utilized by the heterotrophs. Different pollution loads in locations containing identical heterotrophic biomass produce markedly different biomass and species composition in phototrophic growth. Concentration change of pollutants in sewage through dilution or biochemical reactions induces different biocenological effects. (See also W74-11317) (Katz)
W74-11318

DISTRIBUTION OF TOTAL MERCURY IN THE FISHES OF LAKE OAHE,
Environmental Protection Agency, Kansas City, Kans. Region VII.
For primary bibliographic entry see Field 5B.
W74-11319

OXYGEN CONSUMPTION AND ACTIVITY OF THE WHITE SUCKER (CATOSTOMUS COMMERSONI), IN LETHAL AND NONLETHAL LEVELS OF THE ORGANOCHLORINE INSECTICIDE, METHOXYCHLOR,
Queen's Univ., Kingston (Ontario). Dept. of Biology.
K. G. Waiwood, and P. H. Johansen.
Water Research, Vol 8, No 7, p 401-406, 1974. 5 fig, 29 ref.

Descriptors: *Suckers, *Oxygen demand, *Lethal limit, *Insecticides, *Chlorinated hydrocarbon pesticides, Bioassay, Methodology, Respiration, Movement, Continuous flow, Toxicity.
Identifiers: Survival, *Activity, *Methoxychlor, *Sublethal effects, *Catostomus commersoni, Ethanol.

The survival, oxygen consumption and spontaneous activity of suckers were determined at 15 C in water containing different concentrations of methoxychlor in ethanol, ethanol, and no added substances. A dynamic bioassay was used to estimate the 96 h LC50, which was found to be 0.0345 ppm. After 24 h fish exposed to untreated, ethanol-treated and 0.01 ppm methoxychlor-treated water had oxygen uptake rates which were relatively constant and near standard levels. At 0.10 ppm methoxychlor (lethal to all fish within 85 h) oxygen consumption rates were 2-3.5 times as high as those of control fish and activity was greatly increased. The fish lost their balance and the coordination between opercular and locomotor movements. The increase in ventilation that accompanies this hyperactivity may result in increased uptake of insecticide and thereby explain the irreversible nature of the response. (Katz)
W74-11320

THE TOXICITY OF ZINC SULPHATE TO RAINBOW TROUT IN VERY HARD WATER,
Water Pollution Research Lab., Stevenage (England).
J. F. de L. G. Solbe.
Water Research, Vol 8, No 6, p 389-391, 1974. 1 fig, 3 tab, 12 ref.

Descriptors: *Toxicity, *Zinc, *Hardness(Water), *Rainbow trout, Trout, Water quality, Freshwater, Methodology, Analytical technique, Absorption, Hydrogen ion concentration, Lethal limit.
Identifiers: *Zinc sulphate.

Experimentation to determine the toxicity of zinc to rainbow trout in very hard water was performed. The pH of the water directly influences the concentration of dissolved zinc and thus the toxicity. The relation between 48-hour LC50 and the hardness of water that was previously determined for lower values of hardness was also found to apply to an average total hardness of about 500 mg/l as CaCO3. Fish survived longer in harder water and in higher pH water. (Katz)
W74-11321

NUMERICAL INDICES APPLIED TO THE RESULTS OF A SURVEY OF THE MACRO-INVERTEBRATE FAUNA OF THE TAMAR CATCHMENT (SOUTHWEST ENGLAND),
Cornwall River Authority, Launceston (England).
For primary bibliographic entry see Field 5B.
W74-11322

CHLORINATED INSECTICIDE RESIDUES IN THE EGGS OF SOME FRESHWATER FISH,
Iowa Univ., Iowa City. State Hygienic Lab.
L. G. Johnson, and R. L. Morris.
Bulletin of Environmental Contamination and Toxicity, Vol 11, No 6, p 503-510, 1974. 2 fig, 2 tab, 8 ref.

Descriptors: *Pesticides, *Fish eggs, *Dieldrin, *Freshwater fish, Insecticides, Water pollution sources, Water pollution effects, Bioassay, Bioindicators, Absorption, *Polychlorinated biphenyls, *Chlorinated hydrocarbon pesticide, Separation techniques, Analytical techniques, *DDT, *Aldrin, *Heptachlor, Catfishes, Bass.
Identifiers: *Chlordane, *Flonsil.

Measurements of pesticides in various tissues of fish indicates the extent of the relative pollution of a river. Fish eggs were studied because of the wide variation in pesticide contents in the flesh of different catfish species in Iowa. Dieldrin was the major insecticide residue detected in the eggs and the highest levels were found in eggs from those locations where the highest concentrations were determined in fish flesh and water samples. Eggs of the Walleye had the highest lipid and dieldrin content and catfish had the lowest, with eggs of the largemouth bass between. Little information is available on the effect on reproduction of dieldrin in fish eggs. (Katz)
W74-11323

ACUTE TOXICITY OF UNBLEACHED KRAFT MILL EFFLUENT (UKME) TO THE OPOSSUM SHRIMP, NEOMYSIS AMERICANA SMITH,
Virginia Inst. of Marine Science, Gloucester Point.
F. Jacobs, and G. C. Grant.
Water Research, Vol 8, No 7, p 439-445, 1974. 1 fig, 5 tab, 28 ref.

Descriptors: *Pulp wastes, *Toxicity, *Shrimp, Bioassay, *Biochemical oxygen demand, Methodology, Statistical models, Dissolved oxygen, Water pollution effects.
Identifiers: *Opossum shrimp, *Neomysis americana, Sublethal limit, Detoxification.

The 96 hour TL50 values of unbleached kraft mill effluent (UKME) for N. americana were found to range from 3.29-6.85 per cent at 26-28C and 3.90-7.30 per cent at 16-18C. UKME did not lose its toxicity when stored at 4C for 5-7 days. A concentration of 20 per cent effluent killed 100% of the organisms in 8 of the 12 bioassays. Slope functions and confidence limits of TL50 were calculated. Toxicity did not appear to be correlated with the Biological Oxygen Demand (BOD) of individual batches of raw effluent. (Katz)
W74-11324

ECOLOGICAL IMPLICATIONS OF HEAVY METAL IN FISH FROM THE SEVERN ESTUARY,
Bath Univ. (England).
M. W. Hardisty, R. J. Huggins, S. Kartar, and M. Samsbury.
Marine Pollution Bulletin, Vol 5, No 1, p 12-15, January, 1974. 2 tab, 15 ref.

Descriptors: *Heavy metals, Path of pollutants, Food chains, Lead, Cadmium, Zinc, Shrimp, Teleosts, Bioassay, Snail, Spectrophotometry, Environmental effects, Seasonal, Age, Absorption, Lampreys.
Identifiers: *Flounder, *Platichthyes flesus, Pomatoschistus minutus, Liparis liparis, Lampetra ssp, Gobies.

Tissues and organs of the flounder collected from the Severn at Oldbury, in the course of a year long survey, were analysed for lead, cadmium and zinc. Differences were noted in the level of zinc deposition in the various age groups of this teleost, particularly in autumn and summer. To explain these results, the feeding habits of the flounder were studied and heavy metal analyses were conducted on some of its principal foodstuffs and related animals. (Katz)
W74-11325

CONTINUOUS-FLOW BIOASSAYS WITH AQUATIC ORGANISMS: PROCEDURES AND APPLICATIONS,
National Water Quality Lab., Duluth, Minn.
For primary bibliographic entry see Field 5A.
W74-11326

ICHTHYOTOXIC EFFECTS OF SOME ANTI-POLLUTION PRODUCTS,
Laboratorio Provinciale di Igiene e Profilassi, Genoa (Italy); and Genoa Univ. (Italy). Istituto di Farmacologia e Farmacognosia.
I. Baldini, and F. Cugurra.
Water Research, Vol 8, No 5, p 323-324, 1974. 1 tab, 2 ref.

Descriptors: *Toxicity, *Pollution abatement, Fishkill, Laboratory tests, Water pollution control, Hydrocarbons, Oil pollution.
Identifiers: *Antipollution products, *Ichthyotoxicity, Carassius auratus, Esso Corexit, Goldfish.

A study has been carried out on the toxic effects of 14 anti-pollution products used for the dispersion of hydrocarbons in water, on Carassius auratus. The better tolerated products are ESSO Corexit 8666 and 7664; followed by Fina Sol OSR/2 and SC while the other products were found to contain higher ichthyotoxicity characteristics. Both fresh and seawater were used in the experiment. (Katz)
W74-11327

INFLUENCE OF SALINITY AND IONIC EQUILIBRIUM ON THE CONTAMINATION OF ARENICOLA MARINA L. (ANNELIDE: POLYCHEATE) BY CESIUM-137, (INFLUENCE DE LA SALINITE ET DE L'EQUILIBRE IONIQUE SUR LA CONTAMINATION D'ARENICOLA MARINA L. (ANNELIDE: POLYCHETE) PAR LE CAESIUM-137.),
Commissariat a l'Energie Atomique, Fontenay-aux-Roses (France). Service des Recherches Toxicologiques et Ecologiques; and Institut des Sciences de la Nature, Nantes (France). Laboratoire d'Ecologie Animale et Biologie Marine.
C. Amiard-Triquet.
Journal of Experimental Marine Biology and Ecology, Vol 15, No 2, p 159-164, 1974. 1 tab, 11 ref.

Descriptors: *Cesium, *Phaeophyta, *Annelids, *Salinity, Worms, Ions, Absorption, Potassium, Radioisotopes, Bioassay, Adsorption, Equilibrium, Water pollution effects.
Identifiers: *Arenicola marina.

The fixation of 137Cs on fine sand by Arenicola increases when the salinity or K content of water is decreased. The concentration factors for sea water diluted to 60% or with a K level of 50% were twice those for normal sea water, except for the coelomic fluid, the concentration factor of which remained constant. Several assumptions can explain the process: (1) a weaker competition between ions at the lower concentrations; (2) substitution of potassium by cesium; (3) parallel contribution of Cs and K in maintaining a more hypertonic internal environment; and (4) contamination via the food chain in desalinated sea water. (Katz)
W74-11328

HEAVY METAL TOLERANCE OF MARINE PHYTOPLANKTON. I. THE TOLERANCE OF THREE ALGAL SPECIES TO ZINC IN COASTAL SEA WATER,
Norwegian Inst. of Seaweed Research, Trondheim.
A. Jensen, B. Rystad, and S. Melsom.
Journal of Experimental Marine Biology and Ecology, Vol 15, No 2, p 145-157, 1974. 2 fig, 5 tab, 27 ref.

Descriptors: *Zinc, *Algae, *Dialysis, *Toxicity, Diatoms, Aquatic plants, Phytoplankton, Resistance, Laboratory tests, Growth rates, Spectrometry, Methodology, Bioassay, Heavy metals, Bioindicators, Monitoring, Water pollution effects.
Identifiers: *Sublethal effects, *Skeletonema costatum, *Thalassiosira pseudonana, *Phaeodactylum tricornutum.

Tolerance levels to zinc ions of three diatoms grown in dialysis culture in the local fjord water were studied. Declining relative growth rates were observed by addition of 50, 250, and 25,000 micrograms/l of zinc ions, to Skeletonema costatum, Thalassiosira pseudonana, and Phaeodactylum tricornutum, respectively. Reduced final cell concentrations were found at lower zinc levels. A significant increase in zinc uptake at zinc levels that did not seem to influence growth and development took place in at least one species of algae. Two clones of S. costatum showed significant intraspecific differences regarding the tolerance to zinc pollution. Dialysis bioassay was found suita-

ble for monitoring heavy metal pollution of aquatic recipients. (Katz)
W74-11329

METHYLMERCURY EXPOSURE, MERCURY LEVELS IN BLOOD AND HAIR, AND HEALTH STATUS IN SWEDES CONSUMING CONTAMINATED FISH,
National Swedish Food Administration, Stockholm. Dept. of Food Research.
For primary bibliographic entry see Field 5B.
W74-11330

HEXACHLOROBENZENE (HCB) RESIDUES IN FISH,
Bureau of Sport Fisheries and Wildlife, Columbia, Mo. Fish-Pesticide Research Lab.
J. L. Johnson, D. L. Stalling, and J. W. Hogan.
Bulletin of Environmental Contamination and Toxicology, Vol 11, No 5, p 393-398, 1974. 1 fig, 2 tab, 16 ref.

Descriptors: *Fungicides, *Organic compounds, Gas chromatography, Mass spectrometry, Freshwater fish, Anadramous fish, Bioassay, Separation techniques, Salmonids, Trout, Bass, Catfishes.
Identifiers: *Hexachlorobenzene.

Hexachlorobenzene residues found in freshwater and anadromous fish, fish eggs, fry and oil are reported. Samples were collected throughout the United States. HCB is used as a fungicide and in organic synthesis and little is known about its biological impact. Specific sources of HCB contamination in the environment are unknown. (Katz)
W74-11331

EFFECTS OF CRUDE OIL ON THE FEEDING BEHAVIOR OF THE LOBSTER HOMARUS AMERICANUS,
Woods Hole Oceanographic Institution, Mass. Dept. of Chemistry.
J. Atema, and L. S. Stein.
Environmental Pollution, Vol 6, No 2, p 77-86, 1974. 1 fig, 4 tab, 11 ref.

Descriptors: *Oil, *Lobsters, *Behavior, *Feeding rates, Oil spills, Invertebrates, Shellfish, Water pollution effects, Laboratory tests, Methodology, Microscopy, Hydrocarbons, Gas chromatography.
Identifiers: *Sublethal effects, *Feeding behavior, *Homarus americanus, La Rosa crude oil.

Small quantities of crude oil (oil-seawater ratio of 1:100,000) interfered with specific, possibly chemosensory behavior of the lobster, Homarus americanus. In their feeding behavior the period between noticing food and going after it doubled following the addition of oil. In contrast, the water-soluble fraction of this same amount of crude oil had no noticeable effects on chemosensory and feeding behavior. No morphological changes in odor receptors after oil exposure were detected by light and electron microscopy. Chemical analyses showed that the original lipid concentration of water drops when brought in contact with an oil slick. Over a five-day period the oil degraded in seawater. Results suggest that small quantities of whole oil mixed into seawater constitute a noxious smell to the lobster, depressing appetite and chemical excitability and increasing the time taken to find food. (Katz)
W74-11333

THE UTILIZATION OF A SIMPLE EXPERIMENTAL DEVICE FOR STUDY OF WATER POLLUTION IN SITU: COMPARATIVE EFFECTS OF THREE ANTI-PETROLEUM EMULSIFYING AGENTS,
Museum National d'Histoire Naturelle, Paris (France). Laboratoire de Physiologie Generale et Comparee.
J. C. Lacaze.
Tethys. Vol 3, No 4, p 705-715, 1971. Illus. English summary.

Descriptors: *Analytical techniques, Photosynthesis, Chlorophyll, Emulsions.
Identifiers: Corexit, Gamosol, Sefoil.

By establishing in situ experimental ecosystems, pollution research under actual conditions was conducted. The experiment was carried out in an oyster culture basin of a lagoon in the region of Sables d'Olonne (France) by using devices to section off the water into a number of similar natural environmental compartments to be used for pollutant treatments and controls. Each device which isolated 560 liters of water consisted of a polyethylene sheath equipped with 60 cm diameter polyvinyl chloride rings. Floats were attached to the upper rings while the lower ones were weighted and became buried in the sand. Except for the controls, each of these experimental ecosystems received a pollutant at the rate of 40mg/l in the form of an anti-petroleum product. The criteria used to illustrate the effects of pollution were: photosynthetic activity; concentration of chlorophyll a; dry weight of the plankton. The product Corexit produced only weak and temporary changes. Sefoil acted as a fertilizer, provoking a rapid increase in photosynthesis and chlorophyll a concentration; this was followed by considerable growth in the zooplankton, particularly of the copepods which caused the disappearance of the phytoplankton by the end of the experiment. The surface-active fraction of the third product used, Gamosol, caused an almost complete inhibition of photosynthesis during the whole of the 15 day experimental period.--Copyright 1974, Biological Abstracts, Inc.
W74-11334

POLYCHLORINATED BIPHENYLS AND P,P' DDE IN GREEN TURTLE EGGS FROM ASCENSION ISLAND, SOUTH ATLANTIC OCEAN,
Florida Univ., Gainesville. Dept. of Food Science.; and Florida Univ., Gainesville. Dept. of Zoology.
N. P. Thompson, P. W. Rankin, and D. W. Johnston.
Bulletin of Environmental Contamination and Toxicology, Vol 11, No 5, p 399-406, 1974. 3 fig, 1 tab, 15 ref.

Descriptors: *Polychlorinated biphenyls, *DDT, *Turtles, Arochlor, DDD, DDE, Gas chromatography, Separation techniques, Marine animals, Methodology, Path of pollutants, Atlantic Ocean.
Identifiers: *Ascension Island(South Atlantic Ocean), *Chelonia mydas, *Eggs.

Industrial pollutants have become widely distributed in global ecosystems, as have persistent pesticides. Ascension Island, one of the most isolated islands in the South Atlantic Ocean, is utilized by sea birds and turtles (especially the marine pelagic Green Turtle, Chelonia mydas) for breeding. Bird and turtle eggs were sampled for PCB and pesticide analyses. These turtles provide protein for human populations throughout the range of species involved. Gas chromatography of the contents of turtle eggs evidenced PCB's as well as p,p'DDE, DDD, and DDT. Several arochlor compounds were found also. It is apparent that these pesticides were obtained from organisms eaten en route to Ascension Island, in the relatively unpolluted waters of the western South Atlantic Ocean. No concrete information on possible effects on the organism is available. (Katz)
W74-11335

TRACE METALS IN LAKE CAYUGA LAKE TROUT (SALVELINUS NAMAYCUSH) IN RELATION TO AGE,
Corning Glass Works, N.Y. Research and Development Lab.
S. S. C. Tong, W. D. Youngs, W. H. Gutenmann, and D. J. Lisk.
Journal Fisheries Research Board of Canada, Vol 31, No 2, p 238-239, 1974. 1 tab, 5 ref.

Descriptors: *Trace elements, *Chromium, *Lake trout, *Age, Molybdenum, Tin, Trout, Bioassay, Mercury, Analytic technique, Mass spectrometry, Absorption, *New York.
Identifiers: *Fish age, Rhodium, Methyl mercury, *Lake Cayuga(NY), Accumulation, Aluminum, Antimony, Arsenic, Barium, Boron, Cadmium, Cesium, Cobalt, Copper, Gallium, Germanium, Indium, Iron, Lead, Manganese, Nickel, Niobium, Palladium, Praseodymium, Rubidium, Ruthenium, Silicon, Silver, Strontium, Tellurium, Terbium, Thulmium, Titanium, Tungsten, Vanadium, Yttrium, Zinc, Zirconium.

Concentrations of trace metals in lake trout were investigated in relationship to fish age. Chromium concentration increased and molybdenum and tin concentrations decreased in Lake Cayuga lake trout from age 1 to 12 years. The concentration of rhodium ranged from about 100 to 200 ppb. The concentrations of 33 other trace metals in the fish are reported. The concentrations of most metals in lake trout are apparently not related to the age of the fish. (Katz)
W74-11336

ADAPTATION OF THE POLYCHAETE NEREIS DIVERSICOLOR TO ESTUARINE SEDIMENTS CONTAINING HIGH CONCENTRATIONS OF ZINC AND CADMIUM,
Marine Biological Association of the United Kingdom, Plymouth (England). Plymouth Lab.
G. W. Bryan, and L. G. Hummerstone.
Journal of the Marine Biological Association of the United Kingdom, Vol 53, No 4, p 839-857, November 1973. 11 fig, 6 tab, 18 ref.

Descriptors: *Zinc, *Cadmium, *Adaptation, Sediments, *Estuaries, Absorption, *Bioassay, Worms, Environmental effects, Water pollution sources, Toxicity, Analytical technique, Methodology, Isotope studies, Adsorption, Resistance, Salinity.
Identifiers: *Nereis diversicolor, *Polychaetes, *United Kingdom(England).

Concentrations of zinc and cadmium in N. diversicolor have been compared with those of sediments in the estuaries of 26 rivers. The concentrations of zinc in sediments varied by a factor of 30, from 100 to 3000 micrograms/g while the concentrations in worms varied by a factor of only 2.7 from 130 to 350 micrograms/g dry weight. Concentrations of cadmium in the sediments varied by a factor of 46 from about 0.2 to 9.3 micrograms/g and concentrations in the worms were roughly proportional to them and varied by a factor of 45 from 0.08 to 3.6 micrograms/g. These results suggest that zinc is regulated by the worm whereas cadmium is not. Some factors which influence the absorption of heavy metals are discussed and the adaptation of Nereis to high concentrations of metals is compared with that of other organisms. (See also W74-11338) (Katz)
W74-11337

ADAPTATION OF THE POLYCHAETE NEREIS DIVERSICOLOR TO MANGANESE IN ESTUARINE SEDIMENTS,
Marine Biological Association of the United Kingdom, Plymouth (England). Plymouth Lab.
G. W. Bryan, and L. G. Hummerstone.
Journal of the Marine Biological Association of the United Kingdom, Vol 53, No 4, p 859-872, November 1973. 5 fig, 4 tab, 13 ref.

Descriptors: *Manganese, Absorption, Metals, Sediments, Isotope studies, Analytical techniques, Salinity, *Estuaries, *Bioassay, Worms, Seasonal.
Identifiers: *Nereis diversicolor, *Polychaetes, Interstitial water, Isotopic exchange, United Kingdom(SW England).

Concentrations of manganese have been measured in Nereis diversicolor, interstitial water and sediments from estuaries draining the mineralized areas of South-West England. Results from the field observations were supported by experiments using 54Mn. Manganese appears to occur in Nereis in two pools, one exchanging slowly and the other more rapidly. The slowly exchanging pool amounts to roughly 10 micrograms/g on a dry-weight basis and upon this is superimposed the more rapidly exchanging pool, the magnitude of which depends on several factors. The two most important of these are the concentration of manganese in the interstitial water and salinity. With decreasing salinity the concentration factor for manganese increases, and therefore the highest concentrations of manganese are usually found in animals from the least saline areas of an estuary. (See also W74-11337) (Katz)
W74-11338

QUALITATIVE STUDIES ON THE METABOLISM OF NAPTHALENE IN MAIA SQUINADO (HERBST),
Marine Biological Association of the United Kingdom, Plymouth (England). Plymouth Lab.
E. D. S. Corner, C. C. Kilvington, and S. C. M. O'Hara.
Journal of the Marine Biological Association of the United Kingdom, Vol 53, No 4, p 819-832, November 1973. 2 fig, 5 tab, 22 ref.

Descriptors: *Metabolism, *Crabs, *Organic compounds, Food chains, Urine, Animal metabolism, Biochemistry, Aromatic compounds, Methodology, Analytical techniques, Separation techniques, Spectrophotometry, Chemistry.
Identifiers: *Naphthalene, *Maia squinado, 1,2-dihydro-1,2-dihydroxynaphthalene, 1-naphthyl sulphate, 1-naphthyl glucoside, 1-naphthylmercapturic acid, 1-naphthol, Enzyme hydrolysis, Spectrophotofluorometry.

Extraction methods, paper chromatography, enzyme hydrolysis and spectrophotofluorometry were used in identifying unchanged naphthalene and several metabolites of the compound in the urine of Maia squinado (Herbst) that was dosed with the aromatic hydrocarbon napthalene. Unchanged napthalene was not expected in the urine as this has not been observed in studies of other species. Other metabolites were identified in the urine of Maia dosed with 1-naphthol. (Katz)
W74-11339

THE GROWTH KINETICS OF ISOCHRYSIS GALBANA IN CULTURES CONTAINING SUBLETHAL CONCENTRATIONS OF MERCURIC CHLORIDE,
Marine Biological Association of the United Kingdom, Plymouth (England).
A. B. Davies.
Journal of the Marine Biological Association of the United Kingdom, Vol 54, No 1, p 157-169, February 1974. 8 fig, 2 tab, 23 ref.

Descriptors: *Mercury, *Phytoplankton, *Kinetics, *Growth rates, Heavy metals, Absorption, Adsorption, Methodology, Toxicity, Lethal limit, Separation techniques, Cytological studies, Biochemistry.
Identifiers: *Mercuric chloride, *Isochrysis galbana.

Measurements of the effect of mercuric chloride upon the growth of Isochrysis galbana in culture are reported. The mercury was concentrated by the plant cells to a very high level. It is shown that the specific growth rate of the cells in the presence of mercury was reduced linearly by increasing intracellular levels of the metal. The intracellular concentration which just prevented growth (about 2g/l) was not instantly lethal and chemical removal of the mercury allowed growth to start again and achieve population levels approaching those of the control. The presence of mercury in the cells caused almost a doubling in cell size at the highest sublethal concentrations. This was probably due to combination with sulphur-containing compounds that are important in the process of cell division. (Katz)
W74-11340

STUDIES ON THE MECHANISMS OF RED TIDE OCCURRENCE IN HAKATA BAY, 3. THE CHARACTERISTICS OF EFFECTIVE BOTTOM MUD AND ITS GEOGRAPHICAL DISTRIBUTION PATTERN, (IN JAPANESE),
Kyushu Univ., Fukuoka (Japan). Faculty of Agriculture.
T. Honjo, and T. Hanaoka.
Bulletin of the Plankton Society of Japan, Vol 20, No 2, p 126-130, 1974. 4 fig, 4 ref.

Descriptors: *Red tide, *Bottom sediments, Marine algae, Water pollution sources, Water pollution, Laboratory tests, Growth rate, Pigments, Mud.
Identifiers: *Heterosigma sp, *Japan(Hakata Bay), Mud suspensions.

A red tide flagellate, Heterosigma sp., was cultured by addition of bottom mud (mud suspension) collected from Hakata Bay at six different times. The growth rate for each mud sample was calculated. Using these values, the correlation between the distribution of the water area where red tide frequently occurred and that of the bottom mud which caused an acceleration effect are discussed. The characteristics of bottom mud having an accelerating effect on the growth of Heterosigma sp. are also discussed. (Katz)
W74-11341

THE FLAGELLATA EXAMINED FROM POLLUTED WATER OF THE INLAND SEA, SETONAIKAI,
Hiroshima Univ. (Japan).
Y. Hada.
Bulletin of the Plankton Society of Japan, Vol 20, No 2, p 112-125, 1974. 3 fig, 4 tab, 24 ref.

Descriptors: *Eutrophication, Industrial wastes, Water pollution sources, Water pollution effects, Fishkill, Domestic wastes, Sewage, Dinoflagellates, Oysters.
Identifiers: *Blooming flagellates, *Japan(Inland Sea), Yellowtails, Rhodomonas ssp, Heterosigma ssp, Hemieutreptia ssp, Colorless flagellates.

Pollution of the Inland Sea, Hiroshima Bay and the adjacent region by industrial drainage, city sewage and human wastes, has caused a change in the species and number of blooming flagellates. Rhodomonas lacustris, Heterosigma inlandica and Hemieutreptia antiqua frequently bloom and cause great damage to cultured yellowtails in the Inland Sea. The colored flagellates, closely related to colored water have annually increased in number of species. Species blooming in polluted waters are noted. Several new species of algae are described. (Katz)
W74-11342

TOXICITY STUDY OF TWO OIL SPILL REAGENTS TOWARD HUDSON RIVER FISH SPECIES,
Marist Coll., Poughkeepsie, N.Y. Environmental Science Program.
R. Rehwoldt, L. Lasko, C. Shaw, and E. Wirhowski.
Bulletin of Environmental Contamination and Toxicology, Vol 11, No 2, p 159-162, 1974. 3 tab, 8 ref.

Descriptors: *Dispersion, *Oil, *Toxicity, Fish, Lethal limit, Bass, Carp, Eels, Perches, Killifishes, *New York, *Hudson River.
Identifiers: *Linear alkylate sulfonate, *Herder, *Dispersants, Collecting agents, Sublethal limit, Pumpkinseed, Fuel oil.

The median toxicity of No. 2 and No. 4 oils was determined in laboratory tests, as well as the effects of dispersants and collecting agents on this toxicity. Linear alkylate sulfonate (LAS) was the dispersant used and the collecting agent was Herder. Results showed that the dispersant is far more toxic for all species of fish tested than the oil, that the toxicity of oils increased in tanks containing sublethal amounts of LAS, and that Herder was both nontoxic and has little effect on the toxicity of oil to the species tested. (Katz)
W74-11344

GROWTH STIMULATION OF AXENIC RED ALGAE BY SIMPLE PHENOLIC COMPOUNDS,
Uppsala Univ. (Sweden). Inst. of Physiological Botany.
L. Fries.
Journal of Experimental Marine Biology and Ecology, Vol 15, p 1-9, 1974. 5 tab, 27 ref.

Descriptors: *Phenols, *Rhodophyta, Aromatic compounds, Organic compounds, Growth rate, Plant morphology, Biochemistry, Water pollution effects, Methodology, Toxicity, Chemical properties, Plant growth substances, Plant physiology.
Identifiers: *Goniotrichum alsidii, *Polysiphonia urcedata, *Growth stimulation vanillin, p-hydroxybenzaldehyde, Syringaldehyde, Veratraldehyde.

Since coumarin, caffeic acid, and ferulic acid are found to stimulate growth and/or morphology of the red alga Goniotrichum alsidii (Zanard.) Howe, representatives for other groups of phenolic compounds have been investigated in concentrations of 4 . 10-5 to 4 . 10-7 M. The strongest stimulation of growth was obtained with p-hydroxybenzaldehyde, vanillin, syringaldehyde, and veratraldehyde, while corresponding acids gave lower response. 3,4-dihydroxy benzoic acid, 3-methylcatechol, 4-methylcatechol and p-hydroxyphenyl pyruvic acid also enhanced growth. Polysiphonia urceolata (Dillw.) Grev. showed a very small or no response to the same compounds. The role of these active phenols is discussed. The high activity of p-hydroxyphenyl pyruvic acid could point to a plastoquinone, but no further conclusions can be drawn as long as the role of the bromophenols is unknown. (Katz)
W74-11346

DDT, DDE, AND PCBS IN THE TISSUES OF REEF DWELLING GROUPERS (SERRANIDAE) IN THE GULF OF MEXICO AND THE GRAND BAHAMAS,
Texas A and M Univ., College Station.
For primary bibliographic entry see Field 5B.
W74-11347

EFFECT OF OIL ON MARINE ECOSYSTEMS: A REVIEW FOR ADMINISTRATORS AND POLICY MAKERS,
National Oceanographic and Atmospheric Administration, Juneau, Alaska.
For primary bibliographic entry see Field 5G.
W74-11348

SUBLETHAL EFFECTS OF SEVERAL METALLIC SALTS-ORGANIC COMPOUNDS COMBINATIONS UPON THE HETEROTROPHIC MICROFLORA OF A NATURAL WATER,
Simon Fraser Univ., Burnaby (British Columbia). Dept. of Biological Sciences.
L. J. Albright, and E. M. Wilson.
Water Research, Vol 8, p 101-105, 1974. 3 fig, 1 tab, 10 ref.

Descriptors: *Organic compounds, *Microorganisms, *Heavy metals, Salts, Cations, Laboratory tests, Bacteria, Copper, Mercury, Zinc, Ponds, Plant growth, Lethal limit, Water pollution effects.
Identifiers: *Sublethal effects.

The effects of several sublethal combinations of the metallic salts Ag2SO4, CuC12, HgC12, ZnC12 with the organic compounds L-cysteine and albumin upon the heterotrophic activity of the microflora of a natural water are studied. This heterotrophic activity technique is based upon the uptake and mineralization of a radioactivity labelled metabolite by the indigenous microflora of the Simon Fraser University reflecting pool water. Data analysis by Michaelis-Menten enzyme kinetics equations allows the estimation of the maximum rate of heterotrophic activity as well as a determination of the turnover time of the nutrient in question. The addition of a sublethal combination of Cu(2+) and Zn(2+) to a sample of the poolwater decreases heterotrophic activity to approximately the same extent as the additive decrease caused by these two cations added separately to samples of this water. Cu(2+) and Zn(2+) treated water samples do not recover the premetallic salt treatment activity following a three-day incubation. Both L-cysteine and albumin have no protective effect upon heterotrophic activity inhibition caused by Hg(2+) and Ag(+) respectively, at the concentrations used. (Jernigan-Vanderbilt)
W74-11352

THE VANADIUM AND SELECTED METAL CONTENTS OF SOME ASCIDIANS,
California Univ., Davis. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W74-11353

EUTROPHICATION: RECENT DIRECTIONS FOR NEW PERSPECTIVES,
Messina Univ. (Italy). Instituto di Idrobiologia.
S. Genovese.
Rev Int Oceanogr Med. 29 p, 53-61. 1973. Illus. English summary.

Descriptors: *Eutrophication.

The word and the concept of eutrophy have undergone an evolution. In the beginning according to its etymology, it was a natural and optimal condition of a body of water, characterized by its wealth of nutritive substances. Now the word eutrophication is employed only to indicate pollution conditions that are due to an excess of organic substances or to the action of man. New studies and experiments on samples of fresh water, marine water of little lakes and estuaries and brackish lagoons are considered in order to use this potential nutritive wealth at different trophic levels.--Copyright 1974, Biological Abstracts, Inc.
W74-11357

TOXICITY OF CHROMIUM COMPOUNDS UNDER AEROBIC CONDITIONS,
Georgia Inst. of Tech., Atlanta. School of Applied Biology.
R. S. Ingols, and R. H. Fetner.
Journal Water Pollution Control Federation, Vol 33, No 4, p 366-370, April, 1961. 2 fig, 6 ref.

Descriptors: *Chromium, *Toxicity, *Sludge, *Microorganisms, Bacteria, Laboratory tests, Molds, *Aerobic conditions, Water pollution effects.

In aerobic studies a mixed culture (simulating activated sludge) was used for evaluating the toxicity of 500 mg/l chromates. A sludge having a predominance of sphaerotilus or one having a predominance gave rather different responses to the same concentration of chromate. When a sludge was dosed with chromate at each feeding to evaluate the degree of acclimatization, the sludge became very bulky from filamentous growths. Because of the different sludge responses, different toxicities, and the different response of molds and bacteria at 500 mg/l chromate in agar, pure cultures were used to evaluate the effect of chromate on respiration and to count the organisms surviving the respiration study period at various concentrations of chromate. It is concluded that the degree of depression of respiration of an activated sludge by chromate during sewage treatment will depend on the amount of reproduction which would have occurred in the sludge within a short period of time. Chromates have an effect on the genetic expression of microorganisms, and chromic ions show a toxic effect on them, but the data do not indicate where the attack occurs. (Jernigan-Vanderbilt)
W74-11360

INTERRELATIONSHIP OF BIOCHEMICAL RESPONSES TO THE ABSORPTION OF INORGANIC LEAD,
Amsterdam Univ. (Netherlands). Coronel Lab. for Occupational Medicine and Environmental Health.
R. L. Zielhuis.
Archives of Environmental Health, Vol 23 No 4, p 299-312, October, 1971. 6 fig, 3 tab, 96 ref.

Descriptors: *Lead, *Toxicity, *Human pathology, Testing procedures, Inorganic compounds, Biochemistry, Measurement, *Absorption.
Identifiers: Subclinical effects.

Increases in the rate of the absorption of lead by human beings, beyond that which occurs in consequence of the inevitable exposure in the common environment, result in biological responses, represented by certain biochemical phenomena, without, necessarily, the development of any symptoms of lead poisoning. Articles in the scientific and professional literature dealing with the subject are examined. The relationships which exist between these biochemical responses to the absorption of lead are examined in order to demonstrate the extent to which each response can be employed as a prediction of the degree of lead absorption, as well as the status of the other phenomena. In this manner, the relative usefulness of these responses as indicators of the occupational hazard of lead absorption by exposed individuals and groups can be examined. Pb in the blood is recommended as a valid measure of exposure if methods of analysis are appropriate and when used in conjunction with another value such as Pb, ALA or coproporphyrin in the urine. (Jernigan-Vanderbilt)
W74-11362

THE AVIFAUNA OF SWEDEN AS INDICATORS OF ENVIRONMENTAL CONTAMINATION WITH MERCURY AND CHLORINATED HYDROCARBONS,
Environmental Protection Board, Stockholm, (Sweden). Wallenberg Laboratoriet.
For primary bibliographic entry see Field 5B.
W74-11367

MERCURY POLLUTION,
For primary bibliographic entry see Field 5B.
W74-11368

SCIENTISTS FIND HOW MERCURY DAMAGES CELLS,
HSMHA Health Reports, Vol 86, No 9, p 790, September, 1971.

Descriptors: *Animal pathology, *Mercury, *Cytological studies, *Rodents, Biochemistry, Animal physiology, Pollutants, Environmental effects, Toxins, Laboratory tests, Laboratory animals, Measurements, Evaluation.

Correlations between mercury and cell damage have been investigated by a team of University of Wisconsin scientists. Rats were fed doses of mercury simulating human intake and several kinds of cells were analyzed. Findings showed that mercury binds to the cell membrane structure and reduces the cell's amount of RNA. Although some cells are less adversely affected than others, no cells are immune to mercury poisoning. Nerve cells of the dorsal root ganglia located outside the spinal cord, which serve as the common pathway for sensory impulses coming into the central nervous system, suffered a 30% reduction in cell size, a 30% loss in the number of cells and more than 50% loss of RNA. Motor nerve cells in the spinal cord were only slightly affected by mercury. In these cells, mercury which got into the cells became concentrated in axons leaving the cell body unharmed, suggesting a compensatory effort by the cell to restore proper functioning. (Jerome-Vanderbilt)
W74-11369

EARLY ACTIONS OF CADMIUM IN THE RAT AND DOMESTIC FOWL-6 TESTICULAR AND MUSCLE BLOOD FLOW CHANGES,
Georgia Univ., Athens. Dept. of Animal Science.
A. D. Johnson, and P. C. Turner.
Comparative Biochemistry and Physiology, Vol 41A, No 3, p 451-456, 1972. 2 fig, 15 ref.

Descriptors: *Cadmium, *Zinc, *Rodents, *Birds, *Metabolism, Biochemistry, Animal physiology, Toxins, Environmental effects, Metals, Laboratory tests, Measurements.
Identifiers: Blood Flow Rates.

The action of cadmium on very early changes in relative blood flow (RBF) of the testis and muscle in the fowl and rat during the 120 min. period immediately following cadmium injection was examined. Male rats and domestic fowl were injected subcutaneously with 0.03m-moles of cadmium chloride/kg body weight with some of the rats previously treated with zinc acetate. In the fowl no blood flow changes were detected due to Cd. In the rat Cd resulted in a sharp increase in blood flow to the testis at 2.5 and 10 min. after Cd was administered, followed by a return to normal rates. Zinc acetate pretreatment resulted in blood flow which was higher than in the untreated rats. When this pre-treatment was followed by cadmium the sharp differences of blood flow rates of rats pretreated with zinc and rats which were not pretreated were not manifest. Cadmium acts on the vasculature of the testis of the rat but not that of the domestic fowl and zinc pre-treatment in the rat moderates the action of cadmium on the vasculature. (Jerome-Vanderbilt)
W74-11370

EFFECTS OF REGULATORY GUIDELINES OF THE INTAKE OF MERCURY FROM FISH - THE MECCA PROJECT,
National Marine Fisheries Service, Washington, D.C. Fishery Products Research and Inspection Div.
R. Finch.
Fishery Bulletin, Vol 71, No 3, p 615-626, 1973. 6 tab, 7 ref, append.

Descriptors: *Mercury, *Toxicity, *Human physiology, *Fish, Marine animals, *Public health, Diets, United States, Regulation.

The MECCA program applies a survey of the fish consumption habits of a sample of over 4500 individuals, representative of the U.S. population, to build a computer model, which uses known levels of microconstituents in 52 kinds of fish to predict the distribution of the daily intakes of the microconstituents from fish among the survey participants. The model was applied to mercury levels in fish to estimate the effects of guidelines (maximum permitted levels) for fish in protecting the population against excessive intake. The study indicated that, for the sample population, intakes of mercury from fish would remain safe if the guideline for mercury in fish were raised from the present level of 0.5 to 1.5ppm. The effect of such an increase would be of benefit to both the consumer and the fishing industry. This model can be used to predict the distribution of consumer in-

takes from fish of any constituent present in the fish, whether nutritious or potentially hazardous, for which the levels in the edible portion of the 52 kinds of fish used in the model are known. (Jernigan-Vanderbilt)
W74-11372

THE INTERACTION OF MERCURY WITH CADMIUM AND ZINC IN MAMMALIAN EMBRYONIC DEVELOPMENT,
Dartmouth Medical School, Hanover, N. H. Dept. of Anatomy.
T. F. Gale.
Environmental Research, Vol 6, No 1, p 95-105, 1973. 3 fig, 2 tab, 26 ref.

Descriptors: *Mercury, *Cadmium, *Zinc, *Animal pathology, *Embryonic growth stage, Pollutants, Environmental effects, Growth stages, Metabolism, Deformation, Toxicity.

Mercuric acetate together with either cadmium sulfate or zinc sulfate was administered intravenously to pregnant golden hamsters on the eighth gestation day in order to study their effects on embryogenesis. Upon sacrifice on either day 12 or 14 of gestation, the resorption and malformation rates were determined and all living embryos were examined for gross malformations. The detrimental effects of the mercury and cadmium combinations were more severe than those of the mercury and zinc combinations. With both combinations the severity of the embryotoxicity depends upon the method by which the metals are introduced and to some extent upon the dosage level of the Hg. The protective value of the zinc against the embryopathic effects of Hg is also determined by the method of administration of the two metals. Both types of malformations observed after the administration of either Cd or Hg alone were observed in animals treated with a combination of the two. The results are briefly correlated with known biological actions of Cd, Hg, and Zn. (Jerome-Vanderbilt)
W74-11375

CHARACTERISTICS AND RELATIONSHIPS OF MERCURY-RESISTANT MUTANTS AND METHIONINE AUXOTROPHS OF YEAST,
Rochester Univ. School of Medicine, N.Y. Dept. of Radiation Biology and Biophysics.
A. Singh, and F. Sherman.
Journal of Bacteriology, Vol 118, No 3, p 911-918, June, 1974 2 fig, 5 tab, 26 ref. NSF(G1300978)-PHS(GM12702).

Descriptors: *Mercury, *Metabolism, *Bacteria, Laboratory tests, Organic compounds, Testing procedures, Bacteriology, Microbiology, *Yeasts.
Identifiers: *Methionine antotrophs.

Approximately one-half of the mutants of Saccharomyces cerevisiae that are selected as resistant to methyl mercury are also found to require methionine. Eighty four percent of these met mutations occur at the met15 locus, and the remaining 16% occur at the met2 locus. Surprisingly, the methionine-requiring mutants are recovered at a much higher frequency on methionineless media than on media supplemented with methionine. Growth patterns of the met mutants on media having a continuous concentration gradient of methionine and mercury compounds indicate that, at a critical concentration of the mercury compounds, the methionine requirement of certain met mutants is partially or completely alleviated. This was found for met2, met15, and to a lesser extent for met6, but not for any other methionine mutants. This loss of methionine requirement is produced with methyl mercury, phenyl mercury, and mercuric chloride although met2 and met15 strains can be shown to be resistant only to methyl mercury. Other methionine auxotrophs are not resistant to any of the three mercury compounds. It is suggested that met2 and met15 mutants produce a simple diffusible substance, which detoxifies methyl mercury, which reacts with mercuric chloride to produce a sheen, and which is the cause of the methionine requirement. (Jernigan-Vanderbilt)
W74-11381

THE SEASONAL CYCLE OF COPPER CONCENTRATION IN BUSYCON CANALICULATUM L,
University of South Florida, St. Petersburg. Dept. of Marine Science.
S. B. Betzer, and M. E. Q. Pilson.
Biological Bulletin, Vol 146, p 165-175, April, 1974. 4 fig, 1 tab, 16 ref.

Descriptors: *Copper, *Gastropods, *Seasonal, *Sea water, Aquatic life, Mollusks, Testing procedures, Analytical techniques, Spectroscopy, Spatial distribution, Temporal distribution, Path of pollutants, Water pollution effects.
Identifiers: *Busycon canaliculatum.

Copper is present in seawater in only trace amounts (3 microgram/l). The copper concentration in marine gastropods, however, has been shown to be generally high, up to 100 microgram/g. This implies the presence of a mechanism for storing copper taken up either from the diet or directly from seawater. In this study, specimens of the locally abundant channeled whelk, Busycon canaliculatum L., were examined for copper concentration in various organs and tissues at different seasons of the year. Individual tissues of approximately 100 whelks were analyzed for copper content. Tissue copper concentrations showed a high degree of individual variation, but seasonal trends were evident. In the digestive gland, the organ with the highest copper concentration, the mean monthly concentrations were about 5 to 10 times higher in the summer (400-900 MICROGRAM Cu/g fresh weight) than in the winter (65-120 microgram Cu/g). Gut concentrations followed the same seasonal trend. Monthly average blood copper and protein ranged seasonally from an average of 42 microgram/ml in February to 175 microgram/ml in June. Whelks in Narragansett Bay usually begin to feed in late May or early June: the general early summer increases in the copper concentration of most tissues correlated with this commencement of feeding. (Jernigan-Vanderbilt)
W74-11384

TRACE ELEMENTS: A GROWING APPRECIATION OF THEIR EFFECTS ON MAN,
T. H. Maugh, II.
Science, Vol 181, p 253-254, July 20, 1973.

Descriptors: *Trace elements, *Human pathology, *Toxicity, *Nutrients, Inorganic compounds, Organic compounds, Lead, Mercury, Beryllium, Nickel, Public health, Food, *Water pollution effects, Air pollution effects.

The effects of the different trace elements on man are discussed. New research is continually expanding the number of metabolic systems known to be affected by trace elements and is revealing many relationships between trace element concentrations and abnormal states of health. The evaluation of trace element concentrations may soon play a fundamental role in the diagnosis of illness and even in prevention. Many trace elements are beneficial. Fourteen different trace elements have been identified as essential to human health. Cobalt, zinc, and manganese, for example, serve as cofactors for various metabolic enzymes, and iron is an integral component of hemoglobin. On the other hand, lead and methylmercury have been shown to damage the central nervous system. Cadmium decalcifies bones; beryllium is highly carcinogenic; nickel carbonyls have been implicated in lung cancer, etc. There is a great deal yet to be learned about the effects of trace elements on human physiology and a great many benefits to be obtained from this knowledge. However, it will be of little use if the practicing physicians do not start applying this new found knowledge. (Jernigan-Vanderbilt)
W74-11395

5D. Waste Treatment Processes

AGRICULTURAL WASTE WATER ACCOMMODATION AND UTILIZATION BY VARIOUS FORAGES,
Maryland Univ., College Park. Dept. of Agronomy.
V. Larsen, J. H. Axley, and G. L. Miller.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 631, $4.50 in paper copy, $2.25 in microfiche. Maryland Water Resources Research Center, College Park, Technical Report No 19, (1974). 92 p, 12 fig, 28 tab, 81 ref. OWRR A-006-MD(1). 14-01-0001-790.

Descriptors: *Farm wastes, *Sewage treatment, *Forages, *Crop production, *Denitrification, *Nutrient removal, Water reuse, *Nitrogen, *Poultry, Soil water, Groundwater, *Phosphorus, Loam, Sands, *Waste water treatment.
Identifiers: Sassafras sandy loam.

The influence of poultry processing plant sewage upon forages, soil, and the ground water was studied. Harvesting the forages resulted in removal of about 200 to 300 kg N/ha/year from the system. Ammonia volatilization from plant leaves and soil after sprinkler irrigation of the sewage was 35 to 110 kg N/ha/year. It never exceeded 10% of the applied nitrogen. Denitrification within the soil accounted for 20 to 70% of the applied nitrogen. Denitrification was more important in removal of nitrogen than harvesting of the crop, when more than 970 kg N/ha/year was applied annually as sewage. Soil water dilution of the effluent acted as nitrogen sink. It was important at lower sewage application rates, but negligible at the higher rates of 274 to 408 cm/year of sewage. Two and a half ppm NO3-N was found in the ground water at a depth of 6 m when 547 kg N/ha/year was applied. If the nitrogen application was increased to 3219 kg N/ha/year 11.2 ppm NO3-N was found in the ground water at a depth of 9 m. This is slightly above the safe limit of 10 ppm NO3-N assigned by the U. S. Public Health Service. Ninety-five to 99% of the applied phosphorus was removed from the sewage by the first 30 cm of the soil. A maximum phosphate adsorption study showed that it would take a minimum of 15 years for 3 m of this Sassafras sandy loam soil to become saturated with phosphorus if the phosphorus application rates in the sewage (508 cm/year) remained the same.
W74-10903

THE USE OF MAGNETIC IRON OXIDE FOR RECOVERY OF VIRUS FROM WATER,
New Hampshire Univ., Durham. Water Resource Research Center.
F. Pearson, and T. G. Metcalf.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 626, $3.25 in paper copy, $2.25 in microfiche. Research Report No 10, (1974). 38 p, 4 fig, 9 tab, 16 ref. OWRR A-014-NH(1). 14-31-0001-3029.

Descriptors: *Iron oxides, *Viruses, *Microorganisms, Inorganic compounds, *Adsorption, Hydrogen ion concentration, *Waste water treatment, *Pollutant identification.
Identifiers: *Magnetic iron oxide, Aquatic virology, *Poliovirus, *Enterovirus, Elution, Virus recovery, Membrane filters.

Magnetic iron oxide was found to consist of a mixture of the gamma spinel of Fe2O3 and alpha spinel of Fe3O4. Electron micrographs showed a long, irregular, rod-like structure. Virus interaction with magnetic iron oxide was believed to occur at multiple combining points present at each

octahedral site of an Fe atom. The interaction was considered to be an adsorptive process. The degree of adsorption was dependent upon the electrostatic potential in effect between iron oxide and virus coat protein surfaces. The potential developed was a function of structural protein ionization, and its extent the result of solution pH relative to protein isoelectric point. Virus interaction with magnetic iron oxide was independent of iron oxide arrangement in columns or this sandwich-like layers. Virus recovery was most effective when elutions from thin layers were made. Adsorption was favored by acid pH while elution was best at alkaline pH. Virus recoveries of 90 percent were made from litre samples of distilled water. Experimental findings led to a prediction of a limited role for use of magnetic iron oxide for recovery of virus from surface waters.
W74-10905

SCALE-UP SOLID BOWL CENTRIFUGE PERFORMANCE,
Duke Univ., Durham, N.C. Dept. of Civil Engineering.
P. A. Vesilind.
Journal of the Environmental Engineering Division, American Society of Civil Engineers Vol 100, No EE2, p 479-486, April, 1974. 2 fig, 1 tab, 2 ref.

Descriptors: *Centrifugation, *Numerical analysis, *Model studies, *Solid wastes, *Waste disposal, Separation techniques, Hydraulic properties, *Waste water treatment.
Identifiers: *Solid bowl centrifuge.

A method for calculating centrifuge capacities based on data from continuous geometrically similar models is proposed. It is usually not possible to determine from field test data if performance is limited by hydraulic or solids capacity. Scale-up must be in terms of both solids and hydraulic loading. The hydraulic capacity of a larger solid bowl centrifuge can be estimated on the basis of data for a geometrically similar one operating on the same slurry. The solids handling capacity can also be estimated; the lowest rate thus determined will limit performance and must be used for scale-up. (Merritt-FIRL)
W74-10914

EFFICIENCY TESTS FOR MICROSTRAINER WASTE TREATMENT, (MAIKURO SUTORENA NI YORU SHORISUI KOJO SHIKEN),
Nagoya Municipal Government Dept. of Sewage Works (Japan).
Y. Iwata, Y. Ito, and O. Kamata.
Mizu Shori Gijutsu, Vol 14, No 10, p 45-50, October, 1973. 14 ref.

Descriptors: *Sewage treatment, Water treatment, Treatment methods, Municipal wastes, *Biochemical oxygen demand, *Suspended solids, *Waste water treatment.
Identifiers: *Microstrainer.

The efficiency of 510-mesh microstrainer was evaluated using the secondary treatment water of a sewage treatment plant, and a mixture of primary settling pond sewage screened by 60-mesh net and the secondary treatment water. The drum rotation speed, cleansing water pressure, and suspended solids (SS) concentration were varied to observe the turbidity, SS, BOD, COD, and coliforms, by sampling water every two hours for 24 hours. The most important point in the function of a microstrainer is the setting of filter loss head, which has a close relationship with the SS and BOD elimination rates. When a film is formed on the mesh, smaller SS can be eliminated and the elimination rate of a given mesh improves. Therefore, to get a maximum elimination efficiency, the loss water head must be set for quick film formation; yet, if the loss water head is too great, the film will be destroyed and the elimination rate will decrease. If SS concentration of the treatment water is constant, the relationship among loss water head and the drum rotation speed, and cleansing water pressure can be calculated. If the filter speed and cleansing water pressure are constant, the slower the rotation speed, the greater will be the loss water head. When SS was 7 ppm, the filter index was 7/m with the secondary treatment water; with the ximed sewage water of 15 ppm SS, FI was 5.2/m. Loss water head and SS-BOD elimination rates have close relationships, but the elimination conditions are quite different. With the secondary treatment water, when loss head was 19/mm, SS elimination rate was 42.3 percent, but BOD elimination with H (loss head) 12 mm was 31.2 percent. And when H increased, BOD elimination decreased. In the mixed sewage, with the loss head increase, BOD elimination rate decreased, but SS elimination rate increased gradually. The maximum COD elimination rate in any case was 10 percent; the microstrainer seemed ineffective for COD. (Seigle-FIRL)
W74-10915

EXPERIMENTAL HYDROPONIC GARDENING WITH MUNICIPAL WASTE WATER,
Florida Inst. of Tech., Melbourne. Dept. of Oceanography.
D. R. Sias, and T. A. Nevin.
Bulletin of Environmental Contamination and Toxicology, Vol 10, No 5, p 272-278 1973. 3 fig, 1 tab, 9 ref.

Descriptors: *Hydroponics, *Aquiculture, Municipal wastes, *Waste disposal, Municipal water, Irradiation, Chlorination, Agriculture, Tomatoes, *Recycling, *Waste water treatment, Water reuse.
Identifiers: Radishes.

The use of hydroponics in a municipal waste water reuse process was evaluated. Tomatoes and radishes were grown in five beds irrigated as follows: irradiated waste water from a Cobalt 60 facility; potassium nitrate added to waste water before irradiation; KNO3 added to waste water after irradiation, and untreated waste water as a control. Growth in the effluent after chlorination was one quarter of that in the control and was repressed when KNO3 was added to irradiated effluent. Radishes grown in irradiated waste water were appreciably heavier than any crops other than that grown as the control. Tomatoes also grew best in irradiated waste water, but seemed to do better when there was a higher concentration of nitrogen as nitrate. They grew poorly in chlorinated waste water, achieving only one third the weight of the controls. It is concluded that hydroponics, in its present state of development, is readily adaptable to the use of waste water treatment plant effluents, probably removing plant nutrients which might otherwise become pollutants, as well as producing foodstuffs economically. Further, a repeated use of otherwise lost water can be accomplished. (Merritt-FIRL)
W74-10917

RECOMMENDATIONS FOR INSTALLING PVC GRAVITY SEWER PIPING,
Plastics Pipe Inst., New York.
For primary bibliographic entry see Field 8A.
W74-10919

EPOXY TAR LINES BIRMINGHAM'S TRUNK,
For primary bibliographic entry see Field 8A.
W74-10920

SEWER-WITHIN-SEWER SAVES CITY $400,000,
A. W. Nester.
The American City, Vol 89, No 2, p 45-46, February, 1974.

Descriptors: Engineering structures, Sewers, *Combined sewers, *Separated sewers, Manholes, Pipes, *Storm drains, Tunnels, *Urban drainage, *Michigan.
Identifiers: *Flint(MI).

The city of Flint, Michigan effected the separation of 1800 feet of combined sewers by putting a pipe within a pipe, thus saving the city $400,000. The cost of open-cut or tunneling for separating the sewers was $600,000. A 14in. sanitary sewer line was laid in the invert of the old pipe, a cast-in-place, elliptical concrete pipe 60in. high and 40in. wide. The sanitary sewer connections were tied into it, and the line was covered with concrete. First, the combined sewer was cleaned. By working from manhole to manhole, a Transite asbestos-cement pipe was placed one eight foot section at a time. The sections were connected with pressure joints. Sanitary leads from buildings were tapped into the new sewer; new leads were routed along the interior wall contour of the old pipe and were fastened with stainless steel straps and anchors. Quick-set mortar sealant prevented leakage of sanitary sewage into the storm sewer during construction. When the sewer was in place, it was concreted over with 3500psi concrete. (Murphy-FIRL)
W74-10921

USE OF PIPELINES AS AEROBIC BIOLOGICAL REACTORS,
General Electric Co., Philadelphia, Pa.
C. M. Koch, and I. Zandi.
Journal of the Water Pollution Control Federation, Vol 15, No 12, p 2537-2549, December, 1973. 2 fig, 1 tab, 19 ref.

Descriptors: Engineering structures, *Sewers, *Treatment facilities, *Biochemical oxygen demand, Water pollution, Municipal wastes, *Aerobic treatment, *Wastewater treatment, *Mathematical models, Model studies.

Sewerage systems of many cities comprise both pressure and gravity lines. It has been suggested that these lines may be used as aerobic biological reactors to reduce the biochemical oxygen demand on treatment facilities. The utilization of the pipelines as a treatment facility to stabilize the organic portion of solid waste while it is being conveyed in slurry form has also been proposed. Stabilization of the combined solid waste and wastewater is another possibility. If the converted conduits are relatively long, the BOD reduction may be considerable. An analysis of pressure pipeline reactors, sometimes called tubular reactors, with the view towards using pressure pipelines as aerobic biological treatment facilities is presented. A mathematical model and a case study are developed. Parameters considered are wastewater flowrate, initial pressure head, seed inoculum concentration, pipe diameter, gas flow rate, air to slurry ratio, DO concentration, gaseous oxygen concentration, initial BOD, temperature, pumping station location with respect to pressure, and gas injection commencement when the DO levels fall below a given value. Also considered were the biological kinetic constants for municipal wastewater. The economic practicality of this form of treatment was not considered, but it was shown that BOD reduction could be effected. (Murphy-FIRL)
W74-10925

PURE WATERS PROJECT INCLUDES RESTORATION,
R. Dyment.
Water and Sewage Works, Vol 121, No 3, p 52-53, March, 1974.

Descriptors: Water pollution, Water resources development, Water treatment, *Project planning, Projects, Management, Water management(Applied), *Treatment facilities, Methods, *New York, *Lake Ontario, Great Lakes, *Sewers, *Wastewater treatment.
Identifiers: *Monroe County(NY).

Monroe County, New York began a pure waters program in 1970 that will cost $400 million by the time it is completed in 1975. It includes the laying of hundreds of miles of sewer lines, constructing four treatment plants, tearing up streets and private land, and restoring whatever was disturbed to its original state. Lake Ontario and other water bodies in Monroe County are polluted to degrees varying from severe to moderate, with population growth increasing rapidly, thus adding to the pollution problems. The county was divided into four regions according to drainage basins, and sewer networks and treatment plants constructed accordingly. The new treatment plants will provide a minimum of secondary treatment of wastewater. Attempts have been made to minimize the ecological disruptions during the construction of the sewers and treatment plants. (Murphy-FIRL)
W74-10926

LINEARLY DECREASING VELOCITY - WEIRS,
College of Engineering, Madras (India). Dept. of Hydraulics and Water Resources.
D. Chandrasekaran, and N. S. L. Rao.
Surveyor, No 4263, p 30-32, February, 1974. 3 fig, 3 ref.

Descriptors: Engineering structures, Sewers, *Weirs, Control, *Sediments, Treatment facilities, *Wastewater treatment, *Sewage treatment, *Settling basins.
Identifiers: Proportional weirs, Grit chambers.

The problem of settling of sediment particles is important in sewage treatment units as in grit chambers, water purification works and in the treatments of a variety of industrial wastes. Among the many factors that affect settling, the mean velocity of flow can be readily controlled by the designer by fixing suitably designed weirs at the outlets of sedimentation chambers. The exact design of such a weir is presented. The type of proportional weirs presented have potential as velocity controlling devices and are capable of trapping sediments to a removal efficiency of 60 to 85%. (Murphy-FIRL)
W74-10927

DIRECT-FILTRATION STUDIES FOR METROPOLITAN TORONTO,
Proctor and Redfern, Toronto (Ontario).
R. G. Tredgett.
Journal of the American Water Works Association, Vol 66, No 2, p 103-109, February, 1974. 6 fig, 5 tab, 17 ref.

Descriptors: *Water treatment, *Treatment facilities, *Filtration, *Municipal wastes, Water quality, *Flocculation, *Lake Ontario, Great Lakes, Computers, Data processing, *Canada, *Wastewater treatment.
Identifiers: *Toronto.

The Municipality of Toronto will solve an unusual water treatment requirement with a plant addition of modified design for $4.8 million less than the cost of a conventionally designed plant. The old 72mgd plant, located on an offshore island in Lake Ontario, is to be doubled in size. The plant has been operating since 1911 but now only operates seasonally to meet peak summer demands. It has kept detailed records of the raw water quality. Analysis of these, assisted by a computer, supported the possibility of direct filtration. Pilot studies confirmed that efficient filtration at high rates was feasible and that flocculation and settling basins could be eliminated. The new plant will incorporate these features with significant savings. The size and quality of the floc produced for filtration is critical to this design. Whereas settling requires a large flow, high-rate direct filtration requires a strong, pinpoint floc barely visible to the eye. Although the requirements of the new plant are unusual, the principles leading to its design are quite basic and may be of interest in the Great Lakes area or any area with good quality raw water. (Murphy-FIRL)
W74-10928

ARTIFICIAL AQUIFER STOPS STORM POLLUTION.
The American City, Vol 89, No 5, p 106, May, 1974.

Descriptors: *Combined sewers, *Aquifers, *Plastics, *Wastewater treatment, *Storm runoff, *Sewage treatment, *Ohio, Municipal wastes, Cities, Stormwater, Stormflow, Costs, Clarification.
Identifiers: *Stormflow treatment, Clarification-chlorination basin.

Akron, OH has solved the problem of combined storm and sanitary sewers by an underground, plastic-encased artificial aquifer. This is both effective and inexpensive. Stormflows are diverted into a clarifier where waste water is settled and chlorinated. It is then stored in the plastic aquifer until it can be accepted at the sewage treatment plant. Surface land above this underground cell may still be used for other purposes, thus eliminating land acquisition costs. (Prague-FIRL)
W74-10929

MEMBRANES FOR REVERSE OSMOSIS,
United Kingdom Atomic Energy Authority, London (England). (assignee).
D. Walmsley.
U.S. Patent 3,807,571. Issued April 30, 1974. Official Gazette of the U.S. Patent Office, Vol 921, No 5, p 1911, April 30, 1974. 1 fig.

Descriptors: *Patents, *Reverse osmosis, *Wastewater treatment, *Membranes, *Cellulose.
Identifiers: *Cellulose acetate.

A cellulose acetate reverse osmosis membrane, a method of making such a membrane by casting, and a solution suitable for use in casting such a membrane are described. The particular features lie in the selection of a narrow range of acetyl values for the cellulose acetate, obtained by blending cellulose acetates having acetyl values falling outside the selected range, and in the composition of the casting solution which includes acetone dioxan and formamide. The membranes of the invention are further characterized in having Indices of Performance (IOP) of at least 50; frequently the IOP is higher than 100. (Murphy-FIRL)
W74-10932

METHOD AND APPARATUS FOR THE TREATMENT OF INFLUENT WATERS SUCH AS SEWAGE,
M. E. Neel.
U.S. Patent 3,808,123. Issued April 30, 1974. Official Gazette of the U.S. Patent Office, Vol 921, No 5, p 2047, April 30, 1974. 1 fig.

Descriptors: *Patents, *Wastewater treatment, *Oxidation, *Sewage treatment, *Aeration, Odor.

A method and apparatus are described for treating influent waters such as sewage, waste water, discharges from petroleum or chemical plants, or other materials requiring oxidation. A pressure vessel is utilized into which the influent waters are moved under pressure. The pressure within each vessel is maintained within a desired range, and an oxygen stream is pumped into the influent waters. To insure proper contact with the oxygen, detention time within the vessel is provided. Fine bubble diffusers are used to inject the oxygen stream; these diffusers are spaced at various locations and if desired at varying levels within the vessel. Means are provided to vary the quantity of the oxygen stream introduced into the vessel at various points, as well as to vary the percentage of oxygen in the oxygen stream itself. The apparatus and method may be employed at various locations in a sewer system as intermediate steps to prevent excessive build-up of odor or corrosion, or with additional equipment, such as tapered aeration tanks, or aeration tanks, or aerobic digesters, to form a complete treatment plant. (Murphy-FIRL)
W74-10933

DIGESTION BYPRODUCT MAY GIVE ANSWER TO ENERGY PROBLEM,
Knoerle, Bender, Stone and Associates, Chicago, Ill.
J. Goeppner, and D. E. Hasselmann.
Water and Wastes Engineering, Vol 11, No 4, p 30-35, April, 1974. 6 fig, 1 tab.

Descriptors: Energy, *Methane, *Anaerobic digestion, *Sludge digestion, Sewage, *Wastewater treatment, Waste disposal, *Byproducts, Treatment facilities.
Identifiers: *Energy sources.

The methane gas which is produced during the anaerobic digestion of sludge is discussed as a possible source of energy. The volume of methane generated in anaerobic digestion is dependent upon the nature and volume of the wastes. Current data indicate that 15 to 20 cu ft of gas are produced per pound of volatile organic material destroyed. The gas produced by fermentation contains about 60-70% methane; carbon dioxide is the predominant remaining constituent. From 100 gal of sewage it would be theoretically possible to obtain more than one cubic foot of combustible gas having a heating value of 650 BTU. Construction costs of digestion units are integral in determining economic feasibility of such an energy source. It was found that for fuel generation alone anaerobic digestion would not be economically possible. However, the process can be used to affect the use of outside procured energy to operate the treatment plant. The possibility of using this process with animal wastes is explored. The estimated electrical power capacity potentially available from the wastes of 12 million beef cattle represents about one percent of the total U.S. capacity. Assets of this system of energy production are ease of storage of digester gas, and ease of transport. Anaerobic digestion facilities at existing sewage treatment plants incorporate design features which are compatible with adoption of gas recovery systems. (Murphy-FIRL)
W74-10935

PROBLEMS ON POLLUTION AND WATER RESOURCES IN THE NEW YORK CITY METROPOLITAN AREA,
New York City Dept. of Water Resources.
M. Lang.
Hudson River Colloquium, Annals of the New York Academy of Sciences, Vol 250, p 178-181, May 24, 1974.

Descriptors: *Waste water treatment, *Storm drains, *Storm water, Ecosystems, Financing, New York, Costs, Municipal wastes, Sewage treatment.
Identifiers: *Ecological analysis, Ecological monitoring, *New York City.

The size and scope of New York's sewage treatment effort are discussed. The City has made substantial progress toward its goal of high-degree secondary treatment. Of the 1.5 billion gallons/day of sewage in the city, 75 percent currently receive secondary treatment. The other 25 percent is discharged untreated into the estuary, principally from the west side of Manhattan. The city has currently embarked on a program to construct two new treatment plants and upgrade 12 existing ones, the cost of which is estimated to be $2.3 billion. Plans for a storm water treatment plant on the shore of Jamaica Bay are discussed as well as a comprehensive ecological analysis and monitoring program for the bay and parts of the estuary. A more detailed breakdown of expenditures on the basis of Federal, state, and local shares is also given. (Shaffer-FIRL)
W74-10942

NIAGARA FALLS WATER PLANT CONVERTS GRAVITY FILTERS HYDRAULICALLY.
Water and Pollution Control, Vol 112, No 4, p 66-67, April, 1974. 3 fig.

Descriptors: *Filters, Hydraulics, *Gravity, *Treatment facilities, Sands, Gravel, *Canada, Municipal water, Sewage treatment, *Waste water treatment, *Filtration.
Identifiers: *Dual media filters, *Niagara Falls(Ontario), Anthrafilt system.

Niagara Falls (Ontario) sewage treatment plant of 16 rapid gravity filters and maximum capacity of 40 million Imperial gallons per day was having its output impeded by a sluggish rate of filtration. It was necessary to improve this rate without sacrificing water quality. Consulting engineers recommended that the 8 new filters in the expanded portion of the plant be operated at 4 gal/sq ft/minute (twice the original rate); the eight older filters be operated at 1 gal/sq ft/minute; and each of the two settling tanks be operated at rates that would give comparable effluent quality. The new filters were converted to the dual media type. The dual media configuration gives the following structure: anthrafilt on top, a layer of sand below this, a layer of gravel below the sand which is underlaid by the draining system. Unfortunately, in this case the anthrafilt was already in place and it was necessary to devise a way of introducing the sand layer beneath the anthrafilt with minimum disturbance to the filter. This was done by placing sand on top of the anthrafilt and then using a backwash flow (gradually increasing in rate with time) to fluidize the two media which then sorted themselves properly with the sand ending up beneath the anthrafilt. (Shaffer-FIRL)
W74-10943

TUCSON TACKLES TWO PROBLEMS.
Water and Wastes Engineering, Vol 11, No 5, p 66, May, 1974.

Descriptors: *Water reuse, *Waste water treatment, *Irrigation, Costs, Efficiencies, Water conservation, *Arizona, Treatment facilities, Cities.
Identifiers: *Tucson(Ariz).

A $1.5 million waste water reclamation plant, now being built by the city of Tucson, Arizona, will hopefully eliminate two problems for that city. First, the new plant will help relieve the present overload on one of the main 10 inch sewer lines serving the rapidly growing southeast side of the city. Secondly, it will provide irrigation water for the city's two golf courses. Currently, irrigation water for these golf courses is purchased from the city water department. The new practice will be cheaper and will conserve 547.5 million gallons per year of precious groundwater supplies in this desert region. A brief summary of the plants operation and hardware is included. (Shaffer-FIRL)
W74-10945

THE PRESSURE SEWER: A NEW ALTERNATIVE TO THE GRAVITY SEWER,
New York State Dept. of Environmental Conservation, Albany.
I. G. Carcich, L. J. Hetling, and R. P. Farrell.
Civil Engineering-ASCE, Vol 44, No 5, p 50-53, May 1974, 6 fig.

Descriptors: *Sewers, *Waste disposal, Costs, Groundwater, Infiltration, Pressure, *New York, *Pumps, *Waste water treatment.
Identifiers: *Pressure sewers, *Albany(NY), Grinder pumps.

The key to a new pressure sewer system is the grinder pump. Placed in the basement of the house, the pump grinds up large particles in the household sewage and discharges this fluid to a small diameter pressure sewer. The chief advantages gained by use of such a system are the reduction in sewer installation costs (the pipe need only be laid just below ground level); and elimination of groundwater infiltration. In testing performed in the Albany, New York area it was found that pressure-sewer waste was 100 percent stronger on a concentration basis, yet 50 percent less contaminants were in the water on a gm/capita/day basis than in conventional gravity sewer waste water. Sewage volume was 2/3 lower on a per capita basis than for conventional systems, primarily due to the elimination of groundwater infiltration. The small diameter pressure sewer appears to be a proven technology. More than 20 projects using this type of system are either in operation, under construction, or being designed. (Shaffer-FIRL)
W74-10946

SENSORS FOR WATER AND WASTEWATER PROCESS CONTROL,
North Carolina Univ., Raleigh. Dept. of Environmental Sciences and Engineering.
J. D. Johnson.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 44-46, 1974.

Descriptors: *Monitoring, *Sampling, *Waste water treatment, *Water treatment, Water analysis, On-site investigations, On-site data collections, *Pollutant identification.

Proper design of water and waste treatment process monitoring requires selection of the most meaningful parameters for the control of the process. Obtaining a representative sample from a process stream is just as difficult as obtaining a representative sample from a lake or a river. Vertical, horizontal and longitudinal variations in flow patterns are typical in both plug flow and completely stirred reactor system. For this reason in situ measurements are generally more desirable than collection of the sample for the performance of the analysis at another location. It is important to measure both activity and concentration and to control these processes in water treatment practice. Examples are the control of oxygen. The partial pressure, an activity measurement, is the most important parameter in the activitated sludge process while the total quantity of oxygen as determined by Winkler titration is most important in a waste effluent discharged to a stream. The oxygen activity determines the biological activity of the process while the concentration determines the volumetric impact of the low oxygen water on the stream. Many electro-chemical sensors like the glass electrode and the oxygen electrode are now available which measure activity directly when properly calibrated. (See also W74-10947) (Knapp-USGS)
W74-10958

WASTE WATER MONITORING PROGRAM BY THE CITY OF NEW YORK,
New York City Environmental Protection Administration. Dept. of Water Resources.
S. L. Kirschner, E. O. Wagner, and M. Lang.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 61-66, 1974. 2 fig, 1 tab.

Descriptors: *Monitoring, *Sampling, *Waste water treatment, New York, Sewage, Sewage treatment, Laboratory tests.
Identifiers: *New York City.

The City of New York monitors waste water treatment plant operations. New York Harbor is sampled during the summer for a minimum of 12 weeks (four days a week). Top and bottom grab samples at more than 40 locations are obtained and analyzed for temperature, salinity, BOD, dissolved oxygen (DO) and total coliforms (MPN). Four process control laboratories service the 13 treatment plants. Samples are obtained from raw sewage, primary effluent, aerator effluent, thickener effluent, final tank effluent, return sludges and digested sludge and analyzed for suspended solids (SS) and BOD. Volatile acids, alkalinity, pH, methane, CO2, and H2S are routinely measured on digester samples. Chlorides, temperature and pH are also measured on the raw sewage. The City has established limits for some toxic industrial discharges to the sewer system. Waste waters are routinely analyzed for pH, Cd, Cr, CN, Cu, Hg, Ni, BOD and SS. (See also W74-10947) (Knapp-USGS)
W74-10962

AUTOMATED WET CHEMICAL ANALYSIS INSTRUMENTS FOR CONTINUOUS EFFLUENT MONITORING,
Technicon Industrial Systems, Tarrytown, N.Y.
R. D. Goldberg.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 111-118, 1974. 7 fig.

Descriptors: *Monitoring, *Water pollution control, *Waste water treatment, Automation, Sampling, *Pollutant identification, Chemical analysis, Water analysis.

Continuous flow, automatic chemical analysis is a powerful new tool which will permit specific chemical monitoring functions directly in the plant, continuously and with considerable speed and ease. Automated tests, whether performed on discrete samples in the laboratory or continuously for monitoring or process control in the plant or on waterways are more accurate and precise than the equivalent manual tests. Automated analyses costs are usually much lower than conventional testing costs. In the more complex applications these instruments are used to maintain optimum conditions in the manufacturing process or waste treatment process to insure that the presence of pollutants is held to an acceptable minimum at the plant's outfall. (See also W74-10947) (Knapp-USGS)
W74-10971

USE OF CHEMICAL-SENSING ELECTRODES IN MONITORING,
Orion Research, Inc., Cambridge, Mass.
For primary bibliographic entry see Field 5A.
W74-10972

MUSKEGON COUNTY WASTEWATER MANAGEMENT SYSTEM NO I,
Teledyne Triple R, Muskegon, Mich.
Y. A. Demirjian.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 135-154. 1974. 7 fig, 6 tab, 16 ref.

Descriptors: *Waste water treatment, *Irrigation water, *Waste water disposal, Irrigation, Sprinkler irrigation, *Michigan, *Water reuse.
Identifiers: *Land disposal(Wastes), *Muskegon(Mich).

The largest land wastewater treatment facility in operation in the United States is the Muskegon County Wastewater Management System No. 1. The BOD load is being reduced by 90%; the COD load is being reduced by 75%, and the BOD to COD ratio is 1:4. There is no substantial drop in the metal levels in the treated water. The phosphate and ammonia levels drop during the treatment process while nitrate levels show a gradual increase during the treatment process. In

general, the level of nutrients is low in this system, averaging 3 mg/liter of phosphates and nitrate. Irrigated drained water shows substantial improvement in quality. Agricultural studies indicate a 100-400% increase in yield potential of various soils due to irrigation. (See also W74-10947) (Knapp-USGS)
W74-10976

INDUSTRIAL WASTEWATER MONITORING: BASIC CONSIDERATIONS,
Tennessee Univ., Knoxville.
P. A. Pagoria.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 157-164, 1974.

Descriptors: *Monitoring, *Water pollution control, *Industrial wastes, Federal water pollution control act.

Waste water may be monitored to provide information for design and operation of treatment facilities, to provide information to aid in computing process material balances for process control, to serve as a basis for computing user charges or surcharges where industrial wastewaters are discharged into municipal wastewater systems, to provide a record of compliance (or non-compliance) with effluent standards, and to provide records which can serve as a basis for defense in legal actions. Most industries not presently involved in monitoring programs will be involved in the very near future as dictated by the Federal Water Pollution Control Act Amendments of 1972. The basics of measuring flows, sampling techniques, analysis techniques, and continuous monitoring systems are reviewed to help those concerned to develop the most suitable system to fit their particular needs. (See also W74-10947) (Knapp-USGS)
W74-10978

WASTE AND WATER MONITORING,
Dow Chemical Co., Midland, Mich.
C. E. Hamilton.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 165-168, 1974. 2 tab.

Descriptors: *Monitoring, *Water quality, Waste water treatment, Industrial water, Industrial wastes, Water pollution control.

A water and waste monitoring program in a chemical plant measures and controls water quality for the process uses, process wastes, treatment facilities loading, treatment evaluation, plant effluents, and the receiving stream. Many parameters are measured by continuous or continual automatic instrumental systems. Monitoring data from remote locations are recorded locally and telemetered to a central instrument panel in the treatment plant. A total of about 250 million gallons per day of three different waters and one waste water are influent to the plant. Most of this water is used only for cooling, but about 60 million gallons per day is used in processes which generally contaminate it with some amount of a wide variety of organic and inorganic chemicals. Many of these impurities are removed by a secondary biological treatment plant. The problem is especially critical in that the quality of the river downstream under low-flow conditions can be essentially that of the combined effluents. (See also W74-10947) (Knapp-USGS)
W74-10979

DETERMINATION OF CHLORINATION EFFECTS ON ORGANIC CONSTITUENTS IN SEWAGE TREATMENT PLANT EFFLUENTS: A COUPLED 36CL TRACER--HIGH-RESOLUTION CHROMATOGRAPHIC TECHNIQUE,
Oak Ridge National Lab., Tenn.
R. L. Jolley.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 256-264, 1974. 2 fig, 2 tab, 20 ref.

Descriptors: *Chlorination, *Chemical analysis, *Tracers, *Gas chromatography, Chlorine, Analytical techniques, *Sewage treatment, *Waste water treatment, Disinfection, Organic compounds, Path of pollutants.

Chlorination effects on complex, microgram-per-liter solutions of organic compounds at milligram-per-liter chlorine concentrations, in effluents of sewage treatment plants, were studied using Cl-36 radioactive tracers with high-resolution chromatography. Over 40 chlorine-containing organic compounds were chromatographically separated from a chlorinated primary effluent of a domestic sanitary sewage treatment plant. (See also W74-10947) (Knapp-USGS)
W74-10989

LIGHT ENERGIZED OXIDATION OF ORGANIC WASTES,
Montana State Univ., Bozeman. Dept. of Civil Engineering and Engineering Mechanics.
J. W. Sargent, and R. L. Sanks.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 265-272, 1974. 8 fig, 8 ref.

Descriptors: *Organic wastes, *Waste water treatment, Organic compounds, *Oxidation, *Aerobic treatment, Aeration, Industrial wastes.
Identifiers: *Dye-sensitized photo-oxidation, Cresols.

Dye-sensitized aerobic photo-oxidation is a process by which many organic compounds can be oxidized chemically in the presence of a photosensitizing dye, visible light and molecular oxygen. In water solution, the sensitizer dye absorbs energy from visible light and transfers it to the oxygen-substrate reaction system where photo-oxidation occurs. The dye can be removed from reuse and only light energy, energy for aeration, and molecular oxygen are spent. Many of the substances found in domestic and industrial wastes (including refractory organics such as phenols, cresols, TNT, and unsaturated nitriles) should be susceptible to photo-oxidation. Most microorganisms, including viruses, can be killed by low concentrations of photo-sensitizing dyes in the presence of light and oxygen. Methylene blue, a readily available dye, is an effective sensitizer for cresol photo-oxidation and would likely sensitize photo-oxidation of other refractory molecules. The photolysis of cresol occurs as much as 2.8 times faster in an aerobic system than in an anaerobic system. (See also W74-10947) (Knapp-USGS)
W74-10990

THE DETERMINATION OF BENZIDINE IN WASTEWATERS,
Los Angeles County Sanitation Districts, Whittier, Calif. San Jose Creek Water Quality Lab.
For primary bibliographic entry see Field 5A.
W74-10991

CHEMICAL PROFILES OF KRAFT PAPER MILL TREATED WASTEWATERS,
Environmental Protection Agency, Athens, Ga. Southeast Environmental Research Lab.
L. H. Keith.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 278-281, 1974. 2 fig.

Descriptors: *Waste water treatment, *Pollutant identification, Organic compounds, *Pulp wastes, *Industrial wastes, *Organic wastes, Phenols, Organic acids.

In the effluents of two unbleached-kraft paper mills, specific compounds were identified using gas chromatography and mass spectrometry. The primary clarifier exerted little change on the composition or concentration of dissolved organics. The trickling biofilter was effective for reducing the phenolic content but exerted little influence on the other dissolved organics. The aerated lagoon reduced some of the terpene content but most of the terpenes and other neutral compounds remained in 50% or more of their original concentrations. Some fatty and resin acid concentrations were reduced by the lagoon, but more were apparently increased in concentration and a number of new compounds, possibly aquatic life metabolites, appeared during this stage of treatment. Lime flocculation reduced neutral compounds to less than 50% of their original concentration, possibly as a result of adsorption. Lime flocculation had little effect on phenols, but it did cause some reduction of fatty and resin acids. The large biological stabilization pond greatly reduced the phenolic concentration and substantially reduced the concentration of most terpenes and other neutral compounds. Resin acids and terpenes were resistant to both treatments. Phenols as a class were susceptible to both treatments but traces of them could still be found in the fully treated effluents. The more highly substituted phenols were more resistant. (See also W74-10947) (Knapp-USGS)
W74-10992

COAL HUMATES FOR THE REMOVAL OF WATER POLLUTANTS ASSOCIATED WITH THE USE OF COAL,
Missouri Univ., Columbia. Dept. of Chemistry.
S. Harlan, J. Green, and S. Manahan.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 282-284, 1974. OWRR B-095-MO(2).

Descriptors: *Water pollution control, *Air pollution, *Humic acids, *Coal mine wastes, *Acid mine water, Sulfates, Trace elements, Heavy metals, Chelation, Sorption, *Waste water treatment.

Humic substances prepared from coal show considerable potential for the removal from water of several important pollutants arising from coal. Coal humates have acid-base properties and in the basic form are very effective in neutralizing acidity in water. They are chelating materials and bind strongly to a number of heavy metals and iron. Coal humates in the basic form should be effective in absorbing sulfur dioxide from stack gas. The acid-insoluble coal humic acids have potential for sorbing organic pollutants and entraining fine particles. Some of the most common methods for the preparation of coal humates are alternate exposure to air and base, alternate exposure to acidic oxidizing agents and base, and continuous treatment with an oxidizing agent such as air or permanganate in a basic medium. (See also W74-10947) (Knapp-USGS)
W74-10993

CATION-EXCHANGE REMOVAL OF COPPER FROM AMMONIACAL AQUEOUS SOLUTION,
Australian Atomic Energy Commission Research Establishment, Lucas Heights.
P. S. Bull, and J. V. Evans.

Available from NTIS, Springfield, Va. 22161 as AAEC/E259, Price $3.25 printed copy; $2.25 microfiche. Report No E259, March 1973. 17 p, 4 fig, 1 tab, 38 ref.

Descriptors: *Ion exchange, *Adsorption, *Copper, *Waste water treatment, *Nuclear powerplants, Ammonia, Boiler feed water, Pretreatment(Water).

The ability of the cation-exchange resin of a condensate purification plant to remove copper down to very low levels is not likely to be impaired by the presence of ammonia. The complex ammine species formed in the aqueous ammoniacal environment are adsorbed onto cation-exchange resins as readily as the uncomplexed cupric ion and are held as strongly. The presence of copper in the feedwater of direct cycle nuclear power reactors can lead to the deposition in the reactor core of copper oxides on the fuel element surfaces. (See also W74-11028) (Knapp-USGS)
W74-11027

THE PERFORMANCE OF POWDERED ION-EXCHANGE RESINS,
Australian Atomic Energy Commission Research Establishment, Lucas Heights.
P. S. Bull, J. V. Evans, and F. D. Nicholson.
Available from NTIS, Springfield, Va. 22161 as AAEC/E258, Price $3.25 printed copy; $2.25 microfiche. Report No E258, March 1973. 19 p, 9 fig, 2 tab, 16 ref.

Descriptors: *Ion exchange, *Resins, Adsorption, Anion exchange, Cation exchange, Water purification, Boiler feed water, Nuclear powerplants, Pretreatment(Water), *Waste water treatment.

The coating properties and ion exchange performances of powdered ion-exchange resins were examined in a small test facility. Satisfactory resin coatings were obtained with cation:anion resin ratios in the range 1:1 to 3:1 but use of a 9:1 resin ratio resulted in a high pressure drop across the coating. The settled resin volume was a reliable guide to the coating performance of resin slurries. The ion-exchange capacity of the cation resin increased to a small extent with a decrease in sodium concentration in the influent water down to 500 micrograms per liter. Within the ranges examined, resin ratio, resin loading and flow rate had no significant effect on cation capacity. (See also W74-11027) (Knapp-USGS)
W74-11028

EVALUATION OF A MULTIFILTRATION WATER RECLAMATION SUBSYSTEM TO RECLAIM DOMESTIC CLOTHES WASH WATER,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
J. B. Hall, Jr.
Available from NTIS, Springfield, Va. 22161 as NASA TM X-2781, Price $3.00 printed copy; $2.25 microfiche. Technical Memorandum X-2781, May 1973. 25 p, 2 fig, 4 tab, 4 ref, 3 append.

Descriptors: *Water reuse, *Filtration, *Waste water treatment, *Domestic wastes, Phosphates, Bacteria, Detergents, Surfactants, Filters, *Reclaimed water.
Identifiers: *Washing machine wastes.

A multifiltration water reclamation subsystem was tested to determine its capability to recover water from domestic clothes wash water. A total of 32.89 kg of clothes were washed during eight wash cycles which used 0.635 kg of detergent, 549 liters of hot water and 507 liters of cold water. Water recovered at a weighted average process rate of 14.42 liters per hour met the majority of the 23 requirements established for potable water by the U.S. Public Health Service. Average power consumed during this evaluation was approximately 18.8 watt-hours per liter of water recovered. Filter replacement, which was required primarily for the control of micro-organisms in the recovered water, averaged 4.86 filters per 379 liters of wash water processed. The subsystem removed approximately 98 percent and virtually 100 percent of the phosphates and surfactants, respectively, from the wash water. (Knapp-USGS)
W74-11029

COMPUTER SIMULATION OF WASTE WATER TREATMENT BY CHEMICAL-PHYSICAL PROCESSES,
Envirotech Corp., Palo Alto, Calif. Municipal Equipment Div.
A. Anand, J. Gibbs, W. C. Laughlin, Jr., and R. J. Sherwood.
Effluent and Water Treatment Journal, Vol 14, No 3, p 155-160, March 1974. 2 fig, 3 tab, 5 ref.

Descriptors: *Computer models, *Simulation analysis, *Waste water treatment, *Water quality control, Design, Operations, Costs, Municipal water, Wastes, Systems analysis.
Identifiers: *Chemical-physical treatment, Flow sheet, Sensitivity analysis, Sizing, Material balance, Economic analysis.

Chemical-physical waste water treatment (CPT) has become a viable alternative to conventional biological plus tertiary processes. But experience in CPT is limited and the processes themselves raise quite a number of complex design, cost, and operation questions making proper analysis difficult. Described in detail is a program of computer simulation models which offers the flexibility to consider alternative waste water treatment flowsheets, design criteria, costs, and operating parameters and provides the power to analyze these with an exactness and speed impossible to achieve by hand calculation. The program is assessed through timesharing, which allows for cost savings and for writing the program in a conversational mode. Two sources of input provide flexibility: description of the waste water stream entering the flowsheet selected by the user; and a table of data including 550 parameters representing every possible variable that can affect the design and analysis of a complete chemical-physical treatment system. Setting the framework for a material balance, sizing the unit processes governed by the design criteria, and economic analysis of equipment, operating and installed costs are discussed. Performance of sensitivity analysis on design and process parameters is considered. The CPT Simulation Program is a powerful and necessary tool in the proper analysis of chemical-physical treatment. (Bell-Cornell)
W74-11037

A SYSTEMS APPROACH TO PROBLEM ORIENTED RESEARCH PLANNING: A CASE STUDY OF FOOD PRODUCTION WASTES,
International Research and Technology Corp., Arlington, Va.
For primary bibliographic entry see Field 5G.
W74-11040

WATER AERATION EQUIPMENT,
Gulf Oil Corp., Pittsburgh, Pa. (Assignee)
N. R. Whitaker.
U.S. Patent No. 3,807,712, 3 p, 2 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 921, No 5, p 1948, April 30, 1974.

Descriptors: *Patents, *Aeration, *Waste water treatment, *Pollution abatement, Water quality control, Water pollution control, Equipment.

A horizontal cylindrical soaker tank has a vertical cylindrical contactor extending upward from it. Within the contactor are a plurality of vertically spaced horizontal discs mounted on a vertical rotating shaft. Surrounding each disc and adapted to intercept water discharged from the edge of the disc is a vertical sleeve. Water delivered onto each disc is either discharged from the outer edge of the disc against the shell sleeve or falls through openings in the disc to a lower disc. Water flowing down the surfaces of the shell and sleeves is contacted by air delivered under pressure into the contactor. Water draining from the sleeves into the soaker is held under pressure in the soaker to give additional time for adsorption of air. (Sinha-OEIS)
W74-11047

PURIFYING PLANT FOR SEWAGE,
J. Bosje.
U.S. Patent No. 3,809,242, 3 p, 2 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 922, No 1, p 178, May 7, 1974.

Descriptors: *Patents, *Wastewater treatment, *Aeration, *Sewage treatment, *Activated sludge, *Pollution abatement, Water quality control, Water pollution control, Equipment.

A purifying plant for sewage includes an open topped curved tank having an elongated aerating space so shaped that its end walls are located adjacent to each other. The aerating space is partitioned forming an inner channel enclosed within an outer channel in series so that an endless aerating channel is formed. There is a settling chamber in the inner channel for settling out sludge. (Sinha-OEIS)
W74-11052

SEWAGE TREATMENT APPARATUS,
S. R. Kennedy.
U.S. Patent No. 3,809,245, 5 p, 3 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 922, No 1, p 179, May 7, 1974.

Descriptors: *Patents, *Sewage treatment, *Aeration, *Pollution abatement, Water quality control, Water pollution control, *Wastewater treatment, Equipment.

The apparatus comprises a primary liquid circulation chamber in which sewage is circulated around a curved circulation guide barrier that shields an outlet port. Pressurized air is introduced into the chamber. The sludge that is present in the liquid tends to move radially away from the outlet port. The radially moving sludge tends to sink to the bottom of the primary circulation chamber and is drawn outward by suction. Liquid passing through the outlet port enters a flowage chamber, then a second circulation chamber. In the second chamber a scum-collection trough removes the scum floating on the liquid surface. Following secondary circulation the liquid passes into a collection chamber that pools the circulated liquid. The collection chamber includes weirs for skimming a surface layer of the polled water and drainage pipes associated with the weirs for finally removing the skimmed liquid from the sewage treatment apparatus. (Sinha-OEIS)
W74-11053

APPARATUS FOR REMOVING A SUBSTANCE FLOATING AS A LAYER ON THE SURFACE OF A BODY OF LIQUID,
Bertin and Cie, Plasier (France); and Entreprise de Recherches et d'Activites Petrolieres, Paris (France). (assignees)
For primary bibliographic entry see Field 5G.
W74-11057

AERATION DEVICE FOR THE SURFACE AERATION OF LIQUIDS,
J. R. Kaelin.
U S Patent No 3,811,662, 3 p, 6 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 922, No 3, p 809, May 21, 1974.

Descriptors: *Patents, *Wastewater treatment, *Liquid wastes, *Aeration, Pollution abatement, Water pollution control, Water quality control, Equipment.

The aeration device is distinguished in having its supporting legs at the rotor bearing unit end in fork-form and hinged to a cage-like supporting frame surrounding the rotor bearing unit for height adjustment. The position of the supporting legs can be adjusted relative to the rotor bearing unit. (Sinha-OEIS)
W74-11062

SELECTIVE ADSORPTION OF PHENOLS FROM SOLUTION IN WATER,
Texaco, Inc., New York. (assignee).
F. C. McCoy, and R. C. Schlicht.

Descriptors: *Patents, *Phenols, *Waste water treatment, Pollution abatement, Foam separation, Effluents, Water quality control, Water pollution control.
Identifiers: *Chemical treatment, *Refinery wastes, Polyurethane foam.

To recovery phenolic materials from waste water the steps comprise contacting the waste water with a polyurethane foam in the presence of hydrophilic fibers at a temperature in the range of 35 to 200 deg F for a substantial time. The clarified or purified water may subsequently be drawn out. (Sinha-OEIS)
W74-11063

PROCESS FOR TREATING DOMESTIC AND INDUSTRIAL LIQUID WASTES,
G. M. Chappeil.
U S Patent No 3,812,032, 7 p, 2 fig, 1 tab, 7 ref; Official Gazette of the United States Patent Office, Vol 922, No 3, p 896, May 21, 1974.

Descriptors: *Patents, *Waste water treatment, *Biochemical oxygen demand, Water pollution control, Water quality control, Pollution abatement, *Aeration, Industrial wastes, Liquid wastes, Domestic wastes, Aerobic bacteria, Anaerobic bacteria.
Identifiers: *Chemical treatment.

A process for treating liquid wastes involves adding a sufficient amount of acid formula and an alkaline formula to cause the evolution of heat and the flocculation of solids. The resulting mixture is then aerated during at least a portion of the time period in which heat is evolved. The solids and liquids are separated and recovered. The acid formulae comprise: about 30-98 weight percent aluminum sulfate, about 2-20 weight percent of an alkali metal chloride, and, about 0.0005-0.1 weight percent of sodium or potassium hypochlorite. The alkaline formulae comprise about 10-25 weight percent aluminum sulfate, about 35-60 weight percent sodium aluminate, about 15-35 weight percent sodium hydroxide, about 1-10 weight percent of an alkali metal chloride, about 0.5-4 weight percent sodium or potassium hypochlorite, about 1-7 weight percent alkali metal nitrate, about 0.25-5 weight percent of an alkali metal carbonate, and about 0.25-5 weight percent of an alkali metal bicarbonate. (Sinha-OEIS)
W74-11064

ENGINEERING ASPECTS OF WASTE WATER TREATMENT IN AERATED RING-SHAPED CHANNELS,
Technion - Israel Inst. of Tech., Haifa.
Y. Argaman, and E. Spivak.
Water Research, Vol 8, No 5, p 317-322, May, 1974. 4 fig, 2 tab, 5 ref.

Descriptors: *Treatment facilities, *Oxidation lagoons, *Waste water treatment, *Design criteria, Aeration, Hydraulics, Channel flow, Channel morphology, Oxygenation, Flow rates, Suspended solids, Pumping, Reaeration.

Ring-shaped aerated channels may be used for waste water treatment as oxidation ditches, aerated lagoons, or high-rate ponds. The aerators utilized in these systems provide the necessary oxygen and generate a flow velocity that will keep particulate matter in suspension. When mechanical surface aerators are used, the flow velocity and the oxygen supply rate depend on the channel geometry and the aerator rotation speed and submergence. A design procedure that will simultaneously satisfy oxygen and flow requirements is presented. It involves process kinetics, open-channel flow hydraulics, and aerator performance aspects. Experiments in a pilot aeration channel, operated as a high-rate pond, indicate that the minimum flow velocity for such systems is between 3.5 and 6.5 cm/sec when the suspended solids concentration is about 500 mg/liter. The pumping efficiency of a 70 cm wide cage rotor aerator was about 4% when the submergence depth was 12-17 cm. Calculations show that atmospheric reaeration, induced by high flow velocity, is not economical. On the other hand, a combination of a pump and an aerator may prove feasible in cases where flow velocity rather than oxygen supply is the limiting factor. (Witt-IPC)
W74-11065

MODERN PROCESSES OF SLUDGE DEWATERING (MODERNE VERFAHREN ZUR SCHLAMMENTWAESSERUNG),
A. Wohlfarter.
Wochenblatt fuer Papierfabrikation, Vol 101, No 17, p 624-627, Sept. 15, 1973. 9 fig, 1 tab.

Descriptors: *Treatment facilities, *Pulp wastes, *Sludge treatment, *Dewatering, Pulp and paper industry, Filters, Flocculation.

A general review of sludge dewatering principles and processes and of appropriate equipment, such as vacuum and pressure filters, emphasizes a two-wire dewatering press developed by Andritz Machinery Works of Austria. Some illustrative data are included on the dryness content of the filter cake as a function of press throughput and addition of flocculants in the dewatering of a fine-paper mill sludge. (Speckhard-IPC)
W74-11066

DYNAMIC MODELS AND CONTROL STRATEGIES FOR WASTE WATER TREATMENT PROCESSES,
Clemson Univ., S.C. Dept. of Environmental Systems Engineering.
J. F. Andrews.
Water Research, Vol 8, No 5, p 261-289, May, 1974. 30 fig, 49 ref.

Descriptors: *Waste water treatment, *Control systems, *Simulation analysis, *Mathematical models, *Computer models, Digital computers, Model studies, Activated sludge, Anaerobic digestion, Operations research, Operating costs, Reliability, Computer programs, Systems analysis.

Consideration of dynamic behavior and the incorporation of modern control systems can lead to substantial improvements in the performance of waste water treatment plants. Other potential benefits include increased productivity, greater reliability, lower operational costs, more stable operation, and faster startups. Several tools are available for the study of dynamic behavior, including dynamic mathematical models, computer simulation, transient response analysis, and process stability evaluation. Simple examples illustrating the theory and use of these tools are presented. The development of a control strategy is intimately related to the dynamic behavior of a process. Some of the basic questions which must be answered in developing a control strategy are given. A wide variety of control algorithms are available for the processing of information for control. A discussion of several of these (on-off, PID, ratio, cascade, and feedforward) is presented, and an examples if given for the application of on-off control to a biological continuous flow stirred tank reactor. Digital computers are also being increasingly used for control of waste water treatment plants, and a discussion of computer control systems is presented. Examples of dynamic models and control strategies for the step-feed activated sludge process and the anaerobic digester are presented and discussed. In addition, dynamic modeling and computer simulations are used to indicate those design and operation factors for the anaerobic digester which are effective in improving process stability. (Witt-IPC)
W74-11069

TECHNICAL AND ECONOMIC ASPECTS OF WATER AND WASTE WATER OZONATION: A CRITICAL REVIEW,
Ebasco Services, Inc., New York. Nuclear Engineering Dept.
S. B. Majumdar, and O. J. Sproul.
Water Research, Vol 8, No 5, p 253-260, May 1974. 1 fig, 4 tab, 40 ref.

Descriptors: *Ozone, *Water treatment, *Wastewater treatment, *Reviews, Oxidation, Disinfection, Color, Taste, Odor, Turbidity, Suspended solids, Biochemical oxygen demand, Chemical oxygen demand, Tertiary treatment, Industrial wastes, Municipal wastes, Potable water, Toxicity, Detergents, Alkylbenzene sulfonates, Bacteria, Viruses.

Practical and economic aspects of water and waste water ozonation are discussed in comparison with other widely used treatment processes. Ozone eliminates color caused by iron, manganese, or by peaty matter, and eliminates taste and odor due to the presence of phenolic substances. Ozone also reduces the turbidity, suspended solids, BOD, and COD of waste waters and is effective in breaking down detergents and other nonbiodegradable surface active agents including alkylbenzene sulfonate. It is also a powerful disinfectant, killing not only pathogenic bacteria, but also inactivating viruses and other microorganisms not as susceptible to ordinary disinfection practices. Ozonation of water costs less than chlorination followed by dechlorination. For tertiary treatment of secondary effluents, ozonation is considerably cheaper than carbon adsorption. Residual ozone in water can be accurately determined by amperometric and photometric methods. Ozone can be easily detected before it reaches the toxic level, and it neither increases the inorganic salt content nor produces any harmful by-products during tertiary treatment. (Witt-IPC)
W74-11070

CONVERSION OF SVEN-PEDERSEN FLOTATION UNITS INTO A HORIZONTAL SCRAPER CONVEYOR-SEDIMENTATION UNIT AT THE MIZIYA PULP AND PAPER MILL (NYAKOI TEKHNICHESKI SOOBRAZHENIYA PO PREUSTROIVANETO NA FLOTATSIONNITE KLETKI 'SVEN PEDERSEN' V K.TS.KH. (KOMBINAT TSELULOZA I KHARTIYA) MIZIYA ZA RABOTA KATO KHORIZONTALNI SKREBKOVI UTAITELI),
I. Monev.
Tseluloza i Khartiya (Sofia), Vol 4, No 6, p 28-29, 1973. 2 fig.

Descriptors: *Flotation, *Pulp wastes, *Bleaching wastes, *Flocculation, Sedimentation, Pulp and paper industry, Waste water treatment, Water reuse, Fibers(Plant).
Identifiers: Bulgaria, Kraft mills, Straw pulp, Fiber recovery.

A Bulgarian straw kraft pulp mill having two S-P flotation units of 1000 cu m/hr total capacity adapted these savealls to the treatment of 500-550 cu m/hr fiber-carrying effluent waters by converting them into a single sedimentation unit for both alkaline wastes (from pulp washing) and acidic effluents (from chlorine bleaching). The two savealls were linked in parallel for even distribution of effluent between them; a baffle plate was mounted

near the inlet; a scraper conveyor was installed near the bottom; and a dosage meter for addition of flocculants was included to speed fiber sedimentation. Recovered fibers and purified waste water are reused at the mill. (Stapinski-IPC)
W74-11073

ENVIRONMENTAL POLLUTION THROUGH CHEMICAL PROCESSING OF WOOD (UMWELTBELASTUNG DURCH HOLZCHEMISCHE PROZESSE),
For primary bibliographic entry see Field 5B.
W74-11074

FLOCCULATION AND DECANTATION OF PAPER INDUSTRY WASTE WATERS (FLOCULATION ET DECANTATION PES EAUX RESIDUAIRES DE PAPETERIE),
C. de Bouille.
La Papeterie, Vol 95, No 9, p 708-712, 715, Sept 1973. 7 fig, 2 tab.

Descriptors: *Waste water treatment, *Pulp wastes, *Flocculation, *Activated sludge, *Aeration, Effluents, Pulp and paper industry, Treatment facilities, Waste treatment, Costs, Operation and maintenance, Equipment, Biological treatment, Operating costs, Biochemical oxygen demand, Suspended solids, Sludge treatment, Incineration, Dewatering.
Identifiers: Biomat, Sedimat, Gyro-Sedimat, Biosedimat.

The design and operating characteristics of the 'Sedimat' and 'Biomat' systems for primary and secondary treatment of paper and pulp mill effluents are described and illustrated. The 'Sedimat' is a chemical flocculator-clarifier which removes mainly suspended solids. The 'Biomat' is an activated sludge clarifier capable of removing 80-90% of the effluent's 5-day BOD. Combinations of chemical and biological treatments can be accommodated, e.g., in the 'Biosedimat' and the 'Gyro-Sedimat' system. The latter includes means for surface aeration. Cost data for these installations are included. Sludge handling (dewatering, thickening, and incineration) and reuse in paperboard production are also discussed. (Speckhard-IPC)
W74-11080

EFFLUENT POLISHING WITH A BIOLOGICAL FILTER,
Rilling Road Treatment Plant, San Antonio, Tex.
W. N. Wells.
Deeds and Data (Water Pollution Control Federation), p D1, D7-D8, June 1974. 2 fig, 1 tab.

Descriptors: *Trickling filters, *Filtration, *Filters, *Waste water treatment, *Organic loading, *Biochemical oxygen demand, *Suspended solids, Activated sludge, Solids contact processes, Treatment facilities, Equipment, Silica, Porous media, Porosity, Density, Biological treatment, Capillary action.
Identifiers: Foam plastics, Filter media, Surface area.

A simple trickling filter was constructed in 1972 to determine the degree to which effluents from an activated sludge treatment plant could be further stabilized. It was made of a 10ft section of 4ft corrugated iron pipe placed vertically on spaced concrete blocks and filled with a novel filter medium comprising slabs of a porous rigid inorganic silica foam having a density of about 4lb/cu ft and a small pore size such as to impart a surface area of 10,000sq ft/cu ft with 98% voids. The capillary action of this foam was sufficient to maintain a head of 2in of water. Depending on the nature of the influent, the effluent showed BOD reductions of 58.2 to 87.3%, reductions in total suspended solids of 10.6 to 73.6%, and turbidity reductions of 23.3 to 75.6% in three 24-day trial runs at hydraulic loadings of 15 gal/min. (Brown-IPC)
W74-11081

TOTAL OXYGEN DEMAND: A NEW TOOL FOR WASTEWATER ANALYSIS,
Rilling Road Treatment Plant, San Antonio, Tex.
W. N. Wells.
Deeds and Data (Water Pollution Control Federation), p D1, D8-D9, Feb. 1974. 3 fig, 2 tab.

Descriptors: *Oxygen demand, *Biochemical oxygen demand, *Chemical oxygen demand, *Testing procedures, *Instrumentation, *Monitoring, *Waste water treatment, *Treatment facilities, Effluents, Control systems, Automation, Waste treatment, Suspended solids, Solutes.
Identifiers: *Total oxygen demand.

A total oxygen demand (TOD) analyzer is described which continuously monitors changes in oxygen concentration of a gas stream by means of a fuel cell. The operation of this instrument is outlined and illustrated. Tests indicate only a low correlation of TOD data with BOD test results. The TOD test can be valuable in the operation of waste water treatment plants and in special evaluations of substrate biodegradabilities. Being rapid and accurate, it can be used to monitor waste streams. The signal produced could be used to activate alarm systems and to start or stop treatment equipment. Oxidation pond effluents, otherwise difficult to evaluate because of the system's dynamic nature, lend themselves to TOD analyses which can, for instance, differentiate filterable material from soluble matter passing a 4.45 micrometer filter. (Brown-IPC)
W74-11083

VACUUM FILTRATION OF SLUDGE,
Corsicana Water Utilities, Tex.
W. Davis.
Deeds and Data (Water Pollution Control Federation), p D6-D7, D11, Feb. 1974. 2 illus.

Descriptors: *Filters, *Filtration, *Sludge treatment, *Dewatering, *Coagulation, *Treatment facilities, *Equipment, Vacuum drying, Operation and maintenance, Waste water treatment, Waste treatment, Chemicals, Aluminum, Iron compounds, Lime, Polymers.
Identifiers: Aluminum compounds, Coagulants, Ferric chloride, Vacuum, Vacuum filters.

The design of sludge-dewatering vacuum filters and factors affecting their efficient operation are discussed. Filtration rates of sludges can vary considerably, even between similar sludge types at different locations, owing to differences in solids concentration, particle size distribution, and chemical contaminants in industrial waste waters. Nearly all wastewater sludges require chemical preconditioning before dewatering. Most filters in current operation use ferric chloride and lime. Alum, ferric or ferrous sulfate, and aluminum chloride have also been used, and there is recent experimentation with polymeric conditioners. These chemicals act not merely as coagulants but also to loosen water surrounding and entrapped in the sludge particles. The Buchner funnel test serves both to establish feed rates and to determine the required chemical dosages. Proper operation of a vacuum filter requires auxiliary equipment, notably a discharge silencer, a vacuum receiver, an agitator, and chemical storage tanks and feeders. The filter valve and valve disk, sometimes combined, are the heart of the filter. About 25% of the drum area is submerged, and moisture is entrained from the filter cake by an air stream drawn through by the vacuum pump's pressure differential. The best speed for the conditioning tank and filter drum is the slowest one that yields a homogeneous sludge and uniform cake. Any vacuum sufficiently high to pick up and dry the cake is adequate, but a value close to 12in. (30.5 cm) of mercury is preferred. (Brown-IPC)
W74-11084

NEW SWISS SYSTEM FOR SECONDARY TREATMENT IS FIRST IN NORTH AMERICA.
Canadian Pulp and Paper Industry, Vol 27, No 3, p 30-32, March 1974. 4 illus.

Descriptors: *Water conservation, *Waste water treatment, *Pulp wastes, *Wisconsin, *Activated sludge, *Treatment facilities, Sludge treatment, Pulp and paper industry, Dissolved oxygen, Aeration, Aerated lagoons, Centrifuges, Water reuse, Impaired water use, Waste treatment, Dewatering, Suspended solids, Discharge(Water), Costs, Capital costs, Recycling, Microorganisms, Protozoa.
Identifiers: Zurn-Attisholz process, Switzerland, Wisconsin tissue mills(Menasha WI), Deinking mills(Waste paper processing), Tissue papers, Eimco clarifier, Eimco centrifuge, Eimco thickener.

The Zurn-Attisholz (Z-A) two-stage biological (activated sludge) process developed in Switzerland forms the basis for the new effluent treatment facilities installed in Menasha, Wisconsin, by Wisconsin Tissue Mills, a paper producer and reuser of deinked waste papers. Primary treatment is performed in a 450,000-gal capacity 70ft diameter Eimco reactor-clarifier which can remove over 95% of suspended solids after prescreening of coarse matter, such as grit and sand. For secondary treatment, the Z-A system employs three Fuller Suterbilt blowers of 100 hp capable of blowing 2000cu ft/min of air into two equal-sized aeration tanks of 60 x 30 x 17ft (water depth) dimensions. In the first tank, a bacterial mass of 8000ppm is mixed with mixed liquor suspended solids (MLSS) and supplied with 0.5ppm dissolved oxygen. About 200% of incoming flow is recycled from a clarifier basin to the first tank to maintain high MLSS. In the second tank, the MLSS is kept at 2000 ppm and the dissolved oxygen at 2 ppm to assure a predominantly protozoan biomass. Clarified overflow passes to a water reservoir for reuse in papermaking. Sludges are combined and concentrated in Eimco thickeners before dewatering in Eimco centrifuges. Favorable results reported for the nearly two-million-dollar combined installation include, e.g., a 10% reduction in the company's freshwater consumption (from 1.5 to 1.358 million gal/day) in December 1973. Future reductions to less than 750,000 gal/day are expected for effluent discharged to the municipal sewage system. (Witt-IPC)
W74-11085

ACTIVATED CARBON ADSORPTION OF PETROCHEMICALS,
West Virginia Univ., Morgantown.
D. M. Giusti, R. A. Conway, and C. T. Lawson.
Journal of the Water Pollution Control Federation, Vol 46, No 5, p 947-965, May 1974. 10 fig, 5 tab, 46 ref.

Descriptors: *Oil wastes, *Activated carbon, *Adsorption, *Waste water treatment, *Organic compounds, Industrial wastes, Wastes, Chemical wastes, Liquid wastes, Oil industry, Solids contact processes, Molecular structure.
Identifiers: *Petrochemicals, Carboxylic acids, Esters, Aldehydes, Ketones, Alcohols, Glycols.

The relative amenabilities to adsorption of 93 compounds encountered in petrochemical wastes were evaluated in single dosage tests. The results showed that the degree to which pure compounds are adsorbed by activated carbon increases as molecular weight increases and polarity, solubility, and branching decrease. Of the classes of compounds studied, the aromatics exhibited the greatest amenability to activated carbon adsorption. The relative amenabilities to carbon adsorption of straight-chain compounds of less than four carbons decreased in the order: undissociated organic acids, aldehydes, esters, ketones, alcohols, and glycols. Single-component isotherm studies with representative compounds from the five functional groupings indicated a petroleum-based

activated carbon possessing low surface acidity to be most effective. Isotherm studies with mixtures indicated that the degree of adsorption of a two-component system could be predicted with only minor downward adjustment from the single-component data. However, data from a four-component system indicated that only about 60% of the anticipated adsorption was realized, suggesting competition for adsorption sites and adverse solubility effects. Extension of isotherm data for pure compounds and mixtures to three continuous systems resulted in greater than 80% attainment of ultimate equilibrium capacities in all cases. (Witt-IPC)
W74-11086

PILOT PLANT STUDIES OF TURBIDITY AND RESIDUAL CELL MATERIAL REMOVAL FROM MILL EFFLUENTS BY GRANULAR MEDIA FILTRATION,
National Council of the Paper Industry for Air and Stream Improvement, Inc., New York.
R. C. Whittemore, and J. J. McKeown.
NCASI Stream Improvement Technical Bulletin, No. 266, May 1973, 33 p. 12 fig, 8 tab, 4 ref.

Descriptors: *Pulp wastes, *Waste water treatment, *Filtration, *Filters, Particle size, Treatment facilities, Suspended solids, Turbidity, Biochemical oxygen demand, Coagulation, Sludge disposal, Effluents, Pulp and paper industry.
Identifiers: Granular filters, Kraft mills, Board(Paperboard), Mills, Fine-paper mills.

Three filtration systems were tested at an integrated bleached kraft pulp and paper mill, a boxboard mill, and a fine-paper mill, respectively, as adjuncts to existing effluent treatment facilities. All three systems reduced suspended solids and turbidity by 22 to 50%, and two of the systems achieved solids removals of 90% with addition of chemical coagulants. Only small BOD removals (zero to 15%) were achieved. Although the quality of filtrates will depend on the type of waste water being treated, final effluent containing as little as 10 mg/l of suspended solids and 20 JTU turbidity appears a feasible goal. Disposal of the backwash material remains a problem to be solved. (Buchanan-IPC)
W74-11088

PRELIMINARY LABORATORY STUDIES OF THE DECOLORIZATION AND BACTERICIDAL PROPERTIES OF OZONE IN PULP AND PAPER MILL EFFLUENTS,
National Council of the Paper Industry for Air and Stream Improvement, Inc., New York.
R. C. Whittemore, and J. J. McKeown.
NCASI Stream Improvement Technical Bulletin, No. 269, Jan. 1974, 48 p. 19 fig, 9 tab, 60 ref.

Descriptors: *Ozone, *Color, *Coliforms, *Aquatic microorganisms, *Bactericides, *Disinfection, *Pulp wastes, *Bleaching wastes, *Waste water treatment, *Economic efficiency, Costs, Effluents, Pulp and paper industry, Chem-control, Lime, Waste treatment.

The use of ozone as a decolorant and/or disinfectant for raw and treated pulp and paper mill effluents was studied. Per milligram of ozone applied, 15-20 color units were removed from alkaline extraction (bleach plant) wastes, but less than 1 color unit from lime-pretreated effluents. Up to 90% of coliform bacteria can be removed, but large amounts of ozone are needed. Although no strict economic evaluation was made, ozone treatment did not seem to offer cost advantages over other effective effluent decoloring and disinfecting methods. (Buchanan-IPC)
W74-11089

FOCUS ON CONTROL OF WATER POLLUTION IN SAO PAULO STATE AND ITS RELATIONSHIP TO THE PULP AND PAPER INDUSTRIES (ENFOQUE DO CONTROLE DE POLUICOA DAS AGUAS NO ESTADO DE SAO PAULO E SEU RELACIONAMENTO COM AS INDUSTRIAS DE CELULOSE E PAPEL),
C. A. Rameh.
O Papel, Vol 43, No 7, p 35-39, July 1973.

Descriptors: *Governments, *Legislation, *Regulation, *Water pollution control, *South America, *Pulp and paper industry, Pollution abatement.
Identifiers: Brazil, Sao Paulo(Brazil).

Efforts made by the government of Brazil to control water pollution by the paper industry in the state of Sao Paulo are outlined. (Speckhard-IPC)
W74-11090

FLOAT WASH CLARIFIES WHITE WATER FOR PAPER MACHINE RE-USE,
P-A. Akerhagen.
Paper Trade Journal, Vol 158, No 4, p 26-28, Jan 28, 1974. 4 fig.

Descriptors: *Water reuse, *Waste water treatment, *Pulp and paper industry, *Pulp wastes, *Screens, *Fibers(Plant), Water conservation, Water purification, Europe.
Identifiers: White water(Paper machine effluent), Paper machines, Board machines, Tissue machines, Hardboard mills, Fines(Fine fibers), 'Float-Wash' SCREEN, Sweden.

Swedish 'Float-Wash' screens for the purification of paper-machine waste waters have been installed in a hardboard, multiply paperboard, tissue, and waste paper deinking mill. The white water is directed upward against the screen which separates the portion carrying reusable longer fibers from below while removing the portion containing 'fines' (fine fibers) from above. Descriptions and graphic illustrations of the Float-Wash unit are presented, along with flow diagrams. (Hansen-IPC)
W74-11091

DECOLORIZATION OF BLEACH PLANT EFFLUENT AND CHLORIDE HANDLING,
S. Lindberg.
Paper Trade Journal, Vol 157, No 51, p 36-37, Dec 17, 1973. 4 fig, 1 tab.

Descriptors: *Bleaching wastes, *Pulp wastes, *Color, *Ion exchange, *Waste water treatment, *Incineration, Operating costs, Treatment facilities, Europe, Pulp and paper industry, Costs, Chlorides, Waste treatment, Industrial wastes, Water pollution control, Effluents.
Identifiers: Kraft mills, Recovery furnaces, Black liquor, Sweden.

At its kraft pulp and paper mill in Skoghall, Sweden, the Uddeholm Forest Industries Co. is using an ion-exchange system to remove 95% of colored organic matter from bleach plant waste waters. The separated color bodies, essentially free of chlorides, are burned in the mill's black liquor recovery furnace. Some details of the process are indicated. Economic data reveal a net operating cost of $1.44 per ton of softwood pulp (at kappa-number 35) bleached to 90-91% SCAN brightness levels. (Hansen-IPC)
W74-11092

OZONE DECOLORIZATION OF EFFLUENTS FROM SECONDARY TREATMENT,
Wellsbach Ozone Systems Corp., Philadelphia, Pa.
C. Nebel, R. D. Gottschling, and R. J. O'Neill.
Paper Trade Journal, Vol 158, No 5, p 24-25, Jan 28, 1974.

Descriptors: *Ozone, *Waste water treatment, *Pulp wastes, *Costs, *Color, Effluents, Pulp and paper industry, Waste treatment, Economic justification, Economics.

Experimental data indicate that the costs of color removal by ozonation of four different secondary pulp and paper mill effluents range from 2.8 to 6.4 cent per 1000 gal. Methods and economics of ozone generation are described. Generation at the point of use is recommended. (Hansen-IPC)
W74-11095

USE OF THE MULTIROLL PRESS FOR DEWATERING CLARIFIER SLUDGE,
Waplans Mekaniska Verkstads A.B., Vaplan (Sweden).
J. Oledal.
Paper Trade Journal, Vol 158, No 1, p 26-28, Jan 7, 1974. 4 fig, 1 tab.

Descriptors: *Sludge treatment, *Dewatering, *Pressure, Equipment, *Treatment facilities, *Pulp wastes, Operation and maintenance, Operating costs, Costs, Comparative benefits, *Waste water treatment.
Identifiers: Waplan multiroll press, Press rolls, Dewatering presses, Newsprint mills.

Sedimented pulp and paper mill effluent sludge can be dewatered efficiently and economically with the Waplan multiroll press developed by Waplans Mekaniska Verkstads AB. in Sweden. The apparatus consists essentially of four small pressure rolls positioned around a central mother roll in such a way that the space between the latter and the smaller rolls decreases successively from 1 in. at the inlet to 0.25in. at the last press roll. The sludge is fed from a vertical chute into the space between the inlet press roll and mother roll, then forward around the latter through the three subsequent press nips, aided by doctor blades, and ultimately onto an outlet chute. Variables affecting the press performance are discussed. The throughput vs. dry solids correlation is shown for a mechanical sludge from a newsprint mill. An economic comparison between the novel multiroll press and conventional screw presses is made, favoring the former. (Witt-IPC)
W74-11096

WISCONSIN TISSUE EFFLUENT PLANT PIONEERS EUROPEAN PROCESS HERE.
Paper Trade Journal, Vol 158, No 10, p 32-36, March 11, 1974. 3 fig, 4 illus, 1 tab.

Descriptors: *Pulp wastes, *Treatment facilities, *Waste water treatment, *Activated sludge, *Wisconsin, Pulp and paper industry, Sludge treatment, Dewatering, Suspended solids, Biochemical oxygen demand, Centrifuges, Water reuse, Impaired water use, Water conservation, Industrial water, Waste treatment.
Identifiers: Zurn-Attisholz process, Switzerland, Wisconsin Tissue Mills(Menasha WI), Deinking mills(Waste paper processing), Waste paper, Tissue papers, Eimco clarifier.

Wisconsin Tissue Mills in Menasha, Wisconsin, manufactures paper napkins, table and tray covers, place mats, and similar lightweight paper (tissue) products with reuse of a large proportion of deinked waste paper stock. In the mill's new effluent treatment installation, which started up in Sept. 1973 after two pilot-plant runs for over a year, an Eimco reactor-clarifier achieves primary treatment, followed by a two-stage activated sludge system patterned after the Zurn-Attisholz process developed by Cellulose Attisholz AG. of Switzerland. Clarified primary effluent passes either to the secondary system or to the local municipal sewage treatment plant, or else is bypassed to a storage reservoir. Clarified overflow from the secondary system is reused in the deinking mill or in the paper mill. Sludges from both primary and secondary systems are combined and dewatered in centrifuges. Better than anticipated results are reported for the new treatment installation. Thus, in December 1973, the 5-day BOD averaged 18ppm, and suspended solids 25ppm. Of the 340,117 lb of BOD processed in the new installation, only

6558lb went to the municipal sewage plant, equivalent to 98.1% removal; and of the 1,112,492lb of suspended solids processed, only 8352lb were discharged, corresponding to 99.3% removal. (Witt-IPC)
W74-11097

POLLUTION: FILTERS FOR LOCALIZED PURIFICATION (POLLUTION: DES FILTRES POUR UNE EPURATION LOCALISEE).
Papier, Carton et Cellulose, Vol 22, No 7, p 40-41, July 1973. 1 illus.

Descriptors: *Treatment facilities, *Waste water treatment, Equipment, *Water purification, *Filtration, *Filters, Pulp wastes, Pulp and paper industry, Effluents, Water conservation, Pollution abatement, Water pollution control, Water reuse.
Identifiers: Immedium filter, Copefiltre, Upward-flow filters.

Descriptions are given of the 'Copefiltre' and 'Immedium' filter which subject waters and/or waste waters to multistage filtration in a single pass while the fluid rises upward through filter beds of decreasing granular particle size. Such upward-flow filters are being used in the purification of paper industry process water and of paper mill effluents for recovery and recycling. (Speckhard-IPC)
W74-11098

POSSIBILITIES OF USING CHEMICAL-PHYSICAL PURIFICATION PROCESS FOR WASTE WATERS (EINSATZMOEGLICHKEITEN CHEMISCHPHYSIKALISCHER REINIGUNGSVERFAHREN BEI RESTABWAESSERN),
B. Moergeli.
Das Oesterreichische Papier, Vol 10, No 11, p 18, 20-21, Nov 1973. 4 fig, 3 ref.

Descriptors: *Filters, *Filtration, *Flocculation, *Pulp wastes, *Waste water treatment, Treatment facilities, *Monitoring, *Suspended solids, *Colloids, Particle size, Turbidity, Waste treatment, Pulp and paper industry, Adsorption, Organic loading, Polyelectrolytes, Effluents, Silica.
Identifiers: White water(Paper machine effluent), Paper mills, Board mills.

After a general review of physical-chemical effluent treatment processes applicable to paper industry waste waters, a detailed discussion is presented of the requirements, operating parameters, and practical use of solids flocculation plus filtration. The advantage of combining surface filters with volume filters is pointed out. Filtration technology in the paper industry can serve three principally different functions, viz., primary treatment for elimination of coarse and fine suspended solids; secondary removal of colloid particles; and pollution monitoring. Examples are given for filter installations in a fine-paper mill and in a paperboard mill. In the first case, 50-60% of organic matter could be removed by filtration. After subsequent passage through three adsorption columns in series, the clarified effluent contained less than 1ppm turbidity and less than 40mg/l of organic loading (COD, expressed as permanganate consumption). In the second case, a chemical flocculator removed more than 80% of the suspended solids from board machine effluent. Subsequent filtration eliminated 60% of the remaining suspended solids without additional polyelectrolyte and up to 95% with addition of 3ppm polyelectrolyte. Monitoring filters should be high-rate, back-washable media, such as siliceous single-layer granular beds with grain sizes between 1.5 and 5.0mm. (Brown-IPC)
W74-11099

OPERATOR CERTIFICATION PROGRAMS APPLICABLE TO INDUSTRIALLY OWNED WASTE WATER FACILITIES,
National Council of the Paper Industry for Air and Stream Improvement, Inc., New York.
J. J. McKeown.
NCASI Stream Improvement Technical Bulletin, No 272, Feb 1974. 46 p, 1 fig, 5 tab, 5 ref, 4 append.

Descriptors: *Industrial wastes, *Waste water treatment, *Treatment facilities, *Operation and maintenance, *State governments, Personnel, *Permits, Engineering personnel, Professional personnel, Scientific personnel, Training, Manpower, Education, Engineering education, Regulation, Administrative agencies.
Identifiers: Certification(Of operators).

An assessment of current state certification programs for operators of industrial waste water treatment installations is presented. It reviews state requirements for operator certification and analyzes the procedures by which treatment plants are classed or graded for size and complexity as means of determining the required levels of skill, training, education, and prior experience. State certification programs are viewed as essential for insuring closer supervision of industrial facility performance, since their staffing differs from that of municipal waste treatment plants. (Witt-IPC)
W74-11100

OZONE TREATMENT OF DYE WASTE,
Clemson Univ., S.C. Dept. of Chemical Engineering.
E. H. Snider, and J. J. Porter.
Journal of the Water Pollution Control Federation, Vol 46, No 5, p 886-894, May, 1974. 10 fig, 7 tab, 6 ref.

Descriptors: *Waste water treatment, *Industrial wastes, *Dyes, *Ozone, Chemical oxygen demand, Color, Water pollution sources, Liquid wastes, Waste water(Pollution), Wastes, Chemical wastes, Chemical degradation, Chemicals, Oxidation, Organic compounds, Textiles, Suspended solids, Solutes, Volatility, Hydrogen ion concentration.

Textile dye wastes were analyzed for COD, color, total solids, volatile solids and dissolved solids before and after they were treated with ozone at three pH levels. In general, ozone reduced the COD, but the extent of reduction varied from 8 to 55%, depending on the nature of the dye waste. Ozone dramatically reduced the color of the dye wastes, but measurements were affected by high turbidity. As a treatment process, it seems that the best use of ozone in treating dye waste is as a final polishing step following conventional treatment. (Witt-IPC)
W74-11101

USE OF OZONE AND OXYGEN IN ADVANCED WASTE WATER TREATMENT,
W. R. Grace and Co., Baltimore, Md. Pollution Control Systems.
H. M. Rosen.
Journal of the Water Pollution Control Federation, Vol 45, No 12, p 2521-2536, Dec 1973. 13 fig, 2 tab, 17 ref.

Descriptors: *Oxygenation, *Ozone, *Oxygen, *Operating costs, *Capital costs, *Costs, *Comparative costs, *Waste water treatment, Treatment facilities, *Aeration, Equipment, Waste treatment.

The on site production of oxygen by either cryogenic means or pressure swing separation is economical for oxygen aeration systems requiring more than 40t/d (34,280kg/d) of oxygen. At this level, the generation costs are ca. $15/ton ($16.55/1000 kg). Ozonization can achieve significant reductions of COD (to less than 15mg/1) and of BOD (to near-zero) with initial ozone dosages of 0.7-3.0mg per mg/1 of COD. Among several ozone generation methods available, the Lowther plate requires only 2.5-3.5kWh/16 (5.5-7.7kWh/kg) of oxygen to produce 1% ozone. Capital costs for ozone generators run from $80 to $100/lb ($176-220/kg) of daily capacity with oxygen as the feed gas. Operation with air doubles the capital and operating costs. (Witt-IPC)
W74-11103

PROTOTYPE STUDY OF MICROSTRAINING AT A PAPER MILL COMPLEX,
Camp, dresser and McKee, Boston, Mass.
A. E. Rimer.
Journal of the Water Pollution Control Federation, Vol 45, No 12, p 2567-2576, Dec 1973. 7 fig, 6 tab.

Descriptors: *Pulp wastes, *Treatment facilities, *Waste water treatment, *Pulp and paper industry, *Massachusetts, *Filtration, Pumps, Pumping, Filters, Biochemical oxygen demand, Suspended solids, Coagulation, Flocculation, Sludge treatment.
Identifiers: Microstrainers.

Strathmore Paper Co. and Esleeck Manufacturing Co., located next to each other in Turner Falls, Mass., have constructed a joint industrial waste treatment plant and operated it for more than a year. The facility comprises two microstrainers preceded by coagulation and flocculation stages. It provides equivalent secondary treatment for an average of 1.8 million gal/d (6900cu m/d) of waste waters from both mills. Some problems were encountered with microstrainer seals, effluent pumps and associated controls, and the sludge pumps. Operating efficiencies were analyzed to show average removals of 95% of suspended solids (67,000lb or 3000kg/d) and 80% of 5-day BOD. (Witt-IPC)
W74-11104

REVERSE OSMOSIS SEPARATION OF SOME HEAVY METALLIC SALTS IN AQUEOUS SOLUTION (IN JAPANESE),
S. Ishizaka.
Journal of the National Chemical Laboratory for Industry (Tokyo Kogyo Shikensho Hokoku), Vol 68, No 11, p 437-441, Nov 1973, 2 fig, 5 tab, 8 ref. English summary.

Descriptors: *Reverse osmosis, *Membrane processes, *Waste water treatment, *Heavy metals, Zinc, Manganese, Cadmium, Copper, Nickel, Sulfates, Chlorides, Cations, Anions, Sodium chloride, Flow rates, Cellulose, Temperature, Copper sulfate, Copper compounds, Water purification, Industrial wastes, Separation techniques.
Identifiers: Cellulose acetate.

The removal of Zn, Mn, Cd, Cu, and Ni sulfates and chlorides by reverse osmosis through Loeb-type cellulose acetate membranes (cured at 75C and 80C) was studied in comparison with NaCl rejection rates. At water fluxes of 0.9-1.05cu m/sq m/d, rejection rates of 93-98.7% were obtained. More than 99.7% of heavy metal sulfates were removed by the membrane that had been cured at 80C when fluxes were below 0.8cu m/sq m/day. (Brown-IPC)
W74-11105

TREATMENT OF ALKALI EXTRACTION EFFLUENTS BY ULTRAFILTRATION (TRAITEMENT DES EFFLUENTS DE SODATION PAR ULTRAFILTRATION),
Centre Technique de l'Industrie des Papiers, Cartons et Celluloses, Grenoble (France).
M. Pichon, E. Muratore, and P. Monzie.
Revue A.T.I.P. (Association Technique de l'Industrie Papetiere), Vol 28, No 1, p 9-15, 1974. 5 fig, 9 tab, 7 ref.

Descriptors: *Filtration, *Waste water treatment, *Reverse osmosis, *Bleaching wastes, *Membrane processes, *Pulp wastes, Waste treatment, Industrial wastes, Pulp and paper industry, Organic loading, Suspended solids, Biochemical

oxygen demand, Chemical oxygen demand, Color, Flow rates, Temperature, Pressure, Costs, Operating costs, Economics, Recycling, Water reuse, Alkalinity.
Identifiers: *Ultrafiltration, Multistage processes.

Effluents from the alkaline extraction stages of two kraft pulp bleach plants were subjected to ultrafiltration in experiments designed so as to study the influence of process parameters on purification efficiencies. At low concentrations of contaminants, the reduction of pollution loads (BOD, COD, color, and dry solids content) was not significantly affected by operating temperature, pressure, and flux rates, although these variables did affect the permeability of the ultrafiltration membranes. At concentration factors up to four, ultrafiltration reduced the BOD by 46%, the COD by 76.5%, the color by 87%, and the dry solids by 56% on the average. The quality of ultrafiltrates decreased with increasing concentration. At factors above 10, some fractions of the ultrafiltrate showed pollution loads exceeding those of the influents. Since the load could be reduced by a second-stage ultrafiltration, a multistage process is recommended for industrial operation. Present operating costs are rather high, but improvements expected with further R and D work could make ultrafiltration an economically viable process for recycling of pulp and paper mill effluents. (Stapinski-IPC)
W74-11114

FIRST REVIEWS FAVORABLE FOR NEW ROTARY DISC BIOLOGICAL SYSTEM,
M. MacLeod.
Pulp and Paper, Vol 47, No 13, p 54-56, Dec 1973. 3 fig, 1 tab.

Descriptors: *Biodegradation, *Pulp wastes, *Treatment facilities, Equipment, Aerobic treatment, *Waste water treatment, Waste treatment, Biochemical oxygen demand, Sludge, Energy, *Biological treatment.
Identifiers: Bio-Surf process, Autotrol Corp(Milwaukee WI).

The Bio-Surf process developed by Autotrol Corp. (Milwaukee, WI) proved itself capable of competing with aerated biological treatments of pulp and paper mill effluents. Industrial trials confirmed that the process requires less energy, yields a high-solids sludge, and has good resistance to shock loadings. The basic module used is a 25ft long horizontal shaft carrying 250 corrugated polyethylene discs of 12ft diameter which rotate in a vat. A fixed aerobic biomass forms on the disc surfaces. Process variables and capital and operating costs are discussed. Pilot-plant trials are described, in which BOD removals as high as 98% are claimed. (Hansen-IPC)
W74-11115

A NOVEL DEVICE FOR IMPROVED AIR AND LIQUID MIXING (UJTIPUSU KESZULEK FOLYADEKOK ERINTKEZTETESERE ES KEVERESERE LEVEGOVEL),
Z. Nagy, A. Kovacz, J. Rauschenberger, and G. Hupka.
Magyar Kemikusok Lapja, Vol 18, No 11, p 560-565, 1973. 6 fig, 1 tab, 16 ref.

Descriptors: *Fermentation, Sewage, *Sewage treatment, Industrial wastes, *Aerobic treatment, *Aeration, *Waste water treatment, Oil wastes.
Identifiers: Silty sewage.

In silty sewage purification processes, industrial aerobic fermentation processes, and in purification of industrial waters containing emulsified oil or fat, it is necessary to provide an intensive contact between the air and the agitated liquids which contain large quantities of dispersed particles. According to a new process, the potential energy of the air introduced through the bottom of the vertical tubes immersed in the liquid is used for the intensive agitation of the liquid. The material transfer rate (1 to 5 kg 02/cu m hour in the sodium sulfite solution) obtainable in the equipment designed in this way depends not only on the quantity of air, but also on the velocity distribution obtained as a result of liquid agitation. (Murphy-FIRL)
W74-11116

POLYELECTROLYTES AS PRIMARY COAGULANTS FOR POTABLE WATER SYSTEMS,
Topeka Water Dept. Kans.
For primary bibliographic entry see Field 5F.
W74-11117

MARKETS FOR CHEMICALS GROW AND GROW,
Cleveland State Univ., Ohio.
A. C. Gross.
Environmental Science and Technology, Vol 8, No 5, p 414-418, May, 1974. 1 fig, 2 tab.

Descriptors: *Costs, *Chemicals, *Wastewater treatment, *Water treatment, Costs, Coagulation, Membranes, Polyelectrolytes, Lime, Ion exchange, Resins, Filters, Forecasting, Hydrogen ion concentration.
Identifiers: Economic markets, Manufacturers.

Markets for chemicals in the antipollution field are discussed. Although inflation will raise costs of chemicals by perhaps 15% by 1980, growth of water and waste water treatment chemicals is expected to exceed the growth rate of the economy. Specific chemicals will significantly increase. Polyelectrolytes should grow more rapidly than inorganic coagulants, membranes faster than other filter media, ion exchange resins faster than lime, and oxygen should be used more widely than air. The industry is fragmented; six specialty firms control almost half of the formulations. Chemical filter materials, pH neutralizers and salts, biological action chemicals, and internal water preparations are discussed. A larger market is forecast for waste water treatment chemicals than water treatment, but both markets will increase. (Prague-FIRL)
W74-11118

PLASTIC VALVES STAND UP TO CHLORINE.
For primary bibliographic entry see Field 5F.
W74-11123

SOME CURRENT PAPER INDUSTRY ENVIRONMENTAL PROTECTION PROBLEMS,
National Council of the Paper Industry for Air and Steam Improvement, Inc., New York.
I. Gellman.
Paper Trade Journal, Vol 158, No 13, p 28-30, April 1, 1974.

Descriptors: *Energy, *Management, *Pulp wastes, *Waste water, *Bark, Effluents, Technology, Sulphite, Chemicals, Costs, Pulp and paper industry, Lime, Precipitation, Reviews.
Identifiers: Zero pollution discharge, Color detectability, Pulping liquors.

Reviewed are problems relating to three aspects of energy and management. These are: the recovery of energy from materials such as bark and spent pulping liquors which were once considered wastes; the efficient use of energy in managing waste water, atmospheric emissions, and solid wastes; and the harnessing of natural energy for the dispersal of effluents and emissions. Trends towards incineration of various semi-chemical and acid spent sulphite liquors have been due to both technology and the comparison of heat and chemical recovery costs within the paper industry. Aspects discussed include current kraft process studies, spent sulphite liquor studies, bark burnings, innovative industry approaches, high energy use by precipitators, lime kiln and sludge problems, sludge handling, and organic load and decolorization. In addition, zero pollution discharge, color detectability in surface waters, and the need for year round treatment are mentioned. Study of reliability of regional dispersion models, degree of further refinement, and control of operations is recommended. (Prague-FIRL)
W74-11126

FEASIBILITY OF WATER REUSE AT HIGHWAY REST STATIONS,
Virginia Highway Research Council, Charlottesville.
C. E. Parker.
Journal of the American Water Works Association, Vol 66, No 4, p 247-249, April, 1974. 4 tab, 9 ref.

Descriptors: *Water reuse, Effluents, *Costs, *Waste water treatment, Water quality, Phosphorus, Organic carbon, Aeration, *Recycling.
Identifiers: *Flush toilets, *Highway rest areas.

A study was made of the current effluent quality from an existing rest station, the treatment required to upgrade the waste water from the rest area for recycle, the requirements of the rest area, and the response necessary for a recycle system to meet peak demands. Water use was correlated with rest area use and traffic flow. Waste water was examined from an area employing an extended aeration system and a holding pond, and evaluated regarding requirements for toilet flushing at peak needs. It appears that by changing the flow scheme and storage and disinfection scheme, the present effluent could be used for flushing toilets. Capital costs were compared with the necessary system for effluents which are free from phosphorus and low in organic carbon. This recycling alternative would save about $35,000 per rest area. On a test basis, it is indicated that waste water reuse for flushing toilets at highway rest areas offers an alternative to releasing high-quality effluent to a stream. Further demonstration projects are needed. (Prague-FIRL)
W74-11134

THE DIRECT REUSE OF RECLAIMED WASTEWATER: PROS, CONS, AND ALTERNATIVES,
Carollo (John) Engineers, Walnut Creek, Calif.
W. J. Phillips, II.
Journal of the American Water Works Association, Vol 66, No 4, p 231-237, April 1974. 9 tab, 21 ref, 1 photo.

Descriptors: *Water reuse, *Reclaimed water, *Waste water treatment, Impaired water use, Sewage treatment.

With the supply of water decreasing and need increasing, there is growing interest in reuse of wastewater to supplement water supplies. Despite the apparent success of several existing reclamation projects there is evidence that the use of reclaimed wastewater in domestic water supplies may not be as safe as it should be. A comparison of arguments and research data by both proponents and skeptics of water recycling is presented. While several studies indicate that some existing treatment processes are capable of producing a high quality effluent, the effectiveness of present operating processes diverges widely. Developing reliable systems and adequate monitoring techniques are two major problems. The immediate implementation of recycling is not necessary. Further study is needed to determine effluent quality standards required for safe recycling. Alternative approaches to water and wastewater management, such as water salvage and conservation measures, should be developed to allow time for further investigation into all aspects of wastewater reuse. (Deckert-Florida)
W74-11153

PURIFICATION OF WATER POLLUTED WITH DDT AND HEXACHLOROCYCLOHEXANE,
Meditsinskii Institut, Saratov (USSR).
E. V. Shtannikov.
Gig Sanit. Vol 37, No 9, p 97-99, 1972. Illus.

Descriptors: *DDT, *Filters, Coagulation, Sand.
Identifiers: BHC, Lindane, Hexachlorocycldhexane.

Purification of water contaminated with hexachlorocyclohexane and DDT at up to 10 times the maximum allowable dose was analyzed with coagulants, flocculants and active filtering agents. The use of Al2(SO4)3 or Fe2(SO4)3, even in high concentrations was not successful. Increasing the pH by adding Na2CO3 or additional filtering through sand substantially improved the results of coagulation techniques. The effect of polyacrylamide depended on the dose of the reagent. Combined use of Al2(SO4)3, polyacrylamide and filtering through sand provided high degrees of purity. Analysis of current 'barrier functions' of water purification plants using Al2(SO4)3, settling, filtering through sand and chlorination showed limited results. Out of filtering materials tested, ionites were more effective than active C. Ion-exchange polymers were fairly effective; silica sand was ineffective.--Copyright 1974, Biological Abstracts, Inc.
W74-11183

DYNAMICS OF THE UTILIZATION OF ORGANIC POLLUTANTS IN WASTE WATER OF THE OLAINE CHEMICAL-PHARMACEUTICAL PLANT BY THE HETEROTROPHIC BIOCOENOSIS OF ACTIVE SILT, (IN RUSSIAN),
Vsesoyuznyi Nauchno-Issledovatelskii Khimiko-Farmatsevticheskii Institut, Moscow (USSR).
M. A. Luganskii, and V. G. Mitereva.
Khim Farm Zh. Vol 6, No 5, p 40-41, 1972. Illus.

Descriptors: *Activated sludge, *Organic matter, *Wastewater treatment.

Adaptation of spontaneous microflora to water pollution was rapid. Heterotrophic microorganisms appeared as small flakes of active silt by the second day. Massive development of flagellates was also observed by the third day. The amount of flagellates decreased by the 19th day indicating the effective utilization of organic substances by the biocoenosis of active silt.--Copyright 1974, Biological Abstracts, Inc.
W74-11184

ANALYSIS OF LIGHTWEIGHT OIL CONTAINMENT SYSTEM SEA TRIALS,
Hydronautics, Inc., Laurel, Md.
For primary bibliographic entry see Field 5G.
W74-11224

OIL-WATER REGENERATIVE SEPARATOR--FINAL REPORT OF PHASE I DEVELOPMENT PROGRAM OF A CONTINUOUS REGENERATING MOVING BED TO REMOVE OIL FROM OIL-WATER SUSPENSIONS,
Hydronautics, Inc., Laurel, Md.
F. E. Witmer, and A. Gollan.
Available from NTIS, Springfield, Va 22161 as COM-72-11041, Price $3.00 printed copy; $2.25 microfiche. Technical Report No 7080-1, October 1971. 128 p, 38 fig, 11 tab. MARAD Contract C-0-35467.

Descriptors: *Filtration, *Filters, *Oily water, *Water pollution control, Oil pollution, Ships, Emulsions, Separation techniques, Sea water, *Waste water treatment.
Identifiers: Polyurethane filters.

Filter media were tested for use in a continuous regnerating moving bed process for clarifying oily ballast waters. Media investigated includes materials ranging from glass, porous ceramics, metals, wools, plastics, activated carbon, anthracite, in the form of discrete beads or irregular granules, fibrous non-woven mattings and reticulated (open-pore) foams. A partially compacted bed of randomly oriented pieces of an open structured polyurethane foam does an excellent job of scavenging a wide variety of oil contaminants, including both crude and Bunker 'C' types. The resilient nature of this material facilitates reuse by pressing spent media. (Knapp-USGS)
W74-11225

FLOCCULATION OF AQUEOUS QUARTZ SUSPENSIONS WITH NEUTRAL AND CATIONIC POLYMERS IN THE PRESENCE OF CO(II), CA(II), OR FE(III),
Natal Univ. Pietermaritzburg (South Africa). Dept. of Science.
E. A. Appleton.
Available from NTIS, Springfield, Va 22161 as PB-222 026, Price $9.50 printed copy; $2.25 microfiche. South Africa Council for Scientific and Industrial Research Pretoria, Chemical Engineering Research Group, Special Report CENG 004, March 1973. 159 p, 40 fig, 5 plate, 21 tab.

Descriptors: *Flocculation, *Suspension, *Water treatment, Suspended load, Hydrogen ion concentration, Separation techniques, Cations, Zeta potential, Polymers, Adsorption, *Waste water treatment.

Flocculation of quartz suspensions by polymers was studied over the pH range 2 to 11. When quartz suspensions contain only monovalent alkali metal cations in solution, the neutral polyacrylamide polymer adsorbs onto the particles via hydrogen bonds to isolated undissociated surface silanols. Flocculation is caused by polymer bridging and is dependent on adsorption which decreases with increasing pH. Adsorbed polyacrylamide has no effect on the negative zeta potential of the particles. Polyvalent metal cations such as Co(II), Ca(II), or Fe(III) adsorb on quartz particles by ion exchange with protons from surface silanols. This chemisorption changes the negative zeta potentials to more positive values having maxima which are characteristics of the cation species and their equilibrium concentrations. When quartz particles have positive surface sites due to the chemisorbed Co(II), Ca(II) or Fe(III) ions the suspensions are flocculated more effectively by polyacrylamide, at any pH value, than in the absense of these cations. In addition, the zeta potential of the flocculated particles is much less negative. The cationic quaternary ammonium polymer is adsorbed on quartz due to electrostatic attraction and the zeta potential of the particles becomes less negative. The more negative zeta potential of the particles at high pH increases the electrostatic attraction and results in better flocculation. When Co(II) or Ca(II) ions are added to quartz suspensions the cationic polymer causes flocculation provided there are still surface sites available for the ionic bonding of this polymer. However, Fe(III) ions (at low pH values) prevent flocculation by this polymer. (Knapp-USGS)
W74-11235

EFFECTS OF SPREADING MANURE ON GROUNDWATER AND SURFACE RUNOFF,
Tennessee Univ., Knoxville. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5B.
W74-11240

A BEEF CONFINEMENT BUILDING WITH AN OXIDATION DITCH,
Illinois Univ., Urbana. Agricultural Experiment Station.
D. B. Bauling, W. D. Boston, and D. L. Day.
Presented at 1973 Winter Meeting, American Society of Agricultural Engineers, Chicago, Illinois, December 11-14, 1973. 12 p, 10 fig.

Descriptors: *Confinement pens, *Oxidation lagoons, *Cattle, *Farm wastes, *Waste storage, Design, Foaming, Ammonia, Odor, Aeration, Lagoons, Aerated lagoons, Farm lagoons, Recycling, *Waste water treatment.
Identifiers: *Recirculating system, Slotted-floor pens, Aerobic lagoons.

A new cold-confinement unit for beef cattle was placed in operation on November 30, 1972 at the Beef Research Farm on the Urbana-Champaign Campus of the University of Illinois. The unit was designed to receive the animal waste, aerate it for odor control and decomposition, concentrate it for storage, and finally eliminate it from the system. The unit features a totally slotted floor, an oxidation ditch, a mechanically aerated settling lagoon, and an aerobic holding lagoon. All of these are tied together in a continuous recycling system designed to dispose of all the waste without the need to clean the oxidation ditch. The experiment has shown that removal or replacement of cattle, changes in animal diets, variations in dilution or aeration rates, and changes in temperature can all adversely affect the operation of the system. Design considerations, operational problems, and general observations are given. (Cartmell-East Central)
W74-11241

SOIL COLUMNS FOR SIMULATING ANIMAL MANURE RECYCLING,
McGill Univ., Montreal (Quebec). Dept. of Agricultural Engineering.
J. R. Ogilvie, and B. P. Warkentin.
Presented.at 66th Annual Meeting, American Society of Agricultural Engineers, University of Kentucky, Lexington, June 17-20, 1973, Paper No. 73-429, 13 p, 4 fig, 2 tab, 7 ref.

Descriptors: *Farm wastes, *Recycling, *Soils, *Waste disposal, Denitrification, Degradation(Decomposition), Chemical properties, Physical properties, Biological properties, Microorganisms, Drainage, Water, Ions, Chromatography, Chemical oxygen demand, Slurries.
Identifiers: *Soil columns, *Animal manure, Loading rates, Detention time, Flux, Carbonaceous slurry.

Soil columns were used in two studies considering applications of carbonaceous slurry material for soil recycling. The soil columns were found to be useful guides to the effect of manure recycling on soils. Since microbial denitrification and degradation of the applied manure was desired, the study of detention time was of major importance, as was maximum loading of manure slurry. The study of the flux of different solutions through the soil was instrumental in deriving response curves for these experiments. (Frantz-East Central)
W74-11242

REDUCING LABOR DURING BROILER GROWOUT,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Agricultural Extension Service.
W. D. Weaver, Jr.
Poultry Digest, Vol 32, No 382, p 538-540, December, 1973. 6 fig.

Descriptors: *Automation, *Litter, *Farm wastes, *Labor, Cleaning, *Virginia, *Poultry, Farm wastes, Waste treatment.
Identifiers: *Broiler growout, Spreading, Feeder lids, Water jugs.

In Virginia, observations were made on tasks such as getting new litter in and old litter out of the poultry house and on filling and cleaning feeder lids and water jugs. New litter is normally delivered to the house in trucks that can be automatically unloaded. Chain-bottomed trucks can spread the litter in a windrow through the center of the house. From experiments, it has been found that just as good a start can be obtained without

water jugs, providing that at least four eight-foot, shallow, 'V' water troughs are supplied per 1,000 birds. Filling feeder lids is still done by wheelbarrow and coal bucket. One grower in central Virginia used a motorcycle-powered cart. Because of the increasing cost of new litter material, most companies today are practicing a built-up litter program. Under this program, houses are cleaned out once a year. Clear span houses lend themselves best to automated cleanout, although houses with posts can be adapted to most automation. Remodeling can save labor when properly done. (Drewry-East Central)
W74-11243

MORE BEEF ON THE HOOF GOAL OF OHIO RESEARCH.
Feedlot Management, Vol 15, No 11, p 22-24, November, 1973.

Descriptors: *Ohio, Research, *Cattle, *Productivity, *Farm wastes, Recycling, Protein, Feeds, Optimization, Breeding, Waste treatment.
Identifiers: Beef, Crossbreeding, Ralgro, Selenium, Shipping fever, Diethylstilbestrol.

Research on crossbreeding, wastes, protein, Ralgro, selenium and shipping fever has been conducted by animal sceintists at the Ohio Agricultural Research and Development Center. The goal was to produce animals that manufacture quality beef as quickly and efficiently as possible. A crossbreeding project was established in 1970 to help identify the importance of breeding alternatives. The mating scheme was designed to produce straightbred Angus and Charolais cow herds. Results showed Angus calves were smaller at birth, but had a higher rate of survival and higher conformation scores at weaning. They produced more pounds of calf per unit of metabolic size than any other crosses. Feeding animal wastes has potential in starter rations for fat cattle or in rations for brood cows or ewes. Feeding trials, including protein withdrawal, have proved animals to require supplemental protein until calves weigh between 760-790 lbs. Then supplement protein can be discontinued. Three trials involving 100 heifers and 300 steers showed the performance of DES-treated cattle. Blood analyses indicated the selenium content of whole blood was increased 56 days following selenium injection. Research is still being done on selenium injections. Smith and Preston revealed a theory that protein might be a factor in shipping fever; however, results of the study were inconclusive. (Drewry-East Central)
W74-11244

FECAL ELIMINATION OF ESTROGENS BY CATTLE TREATED WITH DIETHYLSTILBESTROL AND HEXESTROL,
Purdue Univ., Lafayette, Dept. of Animal Science.
For primary bibliographic entry see Field 5B.
W74-11245

POULTRY ANAPHAGE IS HERE TO STAY,
Michigan State Univ., East Lansing. Coll. of Agriculture and Natural Resources.
H. C. Zindel.
Egg Industry, Vol 6, No 7, p 22 July 1973. 2 fig, 5 ref.

Descriptors: Poultry, *Farm wastes, *Feeds, *Recycling, Productivity, Fertility, Calcium, Phosphorus, *Waste treatment, Waste disposal, Dehydration.
Identifiers: *Dried poultry wastes, Hatchability, *Poultry anaphage.

On the basis of research, feed costs, and feed ingredient availability, dried poultry and livestock feed. A 12.5 to 25 percent dried poultry waste diet replacement in poultry feeding over a 14 month period caused no change in production, fertility, or hatchability, and no discernible difference was revealed by necropsy. Potential poultry waste sales outlets are livestock and poultry feeds, mushroom culture media, and organic fertilizers. Since phosphorus and calcium were found to increase in recycling, feeding of dried poultry waste as a diet replacement should not exceed 25 percent. Keys to successful poultry waste dehydration are: (1) operation economy and ease, (2) packaging unity, (3) low service and maintenance costs, (4) emission control, (5) consistent and uniform production, (6) efficient continuous operation, and (7) compliance with EPA odor, smoke, and particulate standards. (Hargrove-East Central)
W74-11246

PURIFICATION PLANT EUTIN, APPLICATION OF SIMULTANEOUS PRECIPITATION FOR PHOSPHATE ELIMINATION, (KLAERANLAGE EUTIN, ANDWENDUNG DER SIMULTAN-FAELLUNG ZUR PHOSPHATELIMINIERUNG,),
K. Mudrack, and G. Stobbe.
Wasser Luft und Betrieb, Vol 18, No 5/6, p 289-292, 1974. 4 fig, 2 tab, 2 ref.

Descriptors: *Phosphates, *Precipitation, *Iron compounds, Sludge treatment, Biochemical oxygen demand, *Waste water treatment.
Identifiers: *Iron sulphate, *Germany(Eutin).

In the city of Eutin, Germany, treating the sewerage of a population of over 17,800, waste water from a military caserne, a police training camp, and the usual small trade, the possibilities of phosphate-elimination and of influencing the sludge index by addition of iron sulfate into the activation basin were studied. This was done both in the laboratory and in practical operation of the city's mechanical-biological treatment plant. Amounts of 16g Fe/cu m and 46g/cu m were added. Phosphate elimination rates of about 80 to 90 percent were achieved, leaving a residual concentration of 2 to 5mg/liter of phosphate. The sedimenting properties of the sludge were improved and the volume of surplus sludge was reduced. The purification efficiency of the plant, as measured by BOD and KMn04 consumption, was improved. (Shaffer-FIRL)
W74-11247

THE EFFECT OF SURPLUS ACTIVATED SLUDGE IN FILTER PRESS PERFORMANCE,
Mansfield Sewage Works (England).
C. E. Brade, and N. E. W. Sambidge.
Water Pollution Control, Vol 73, No 2, p 138-149, 1974. 10 fig, 7 tab, 6 ref.

Descriptors: *Sludge treatment, *Dewatering, *Activated sludge, Treatment facilities, Digestion, Filters, *Waste water treatment.
Identifiers: Elutriation, United Kingdom(Mansfield-Eng).

Experiments to press raw primary and humus sludge, raw mixed sludge which contains surplus activated, digested mixed sludge, and elutriated digested mixed sludge are recounted. Test results led to the following conclusions: raw primary/humus sludge was readily dewatered using batch conditioning techniques; the poor cakes were due to aging after addition of the conditioner; raw mixed sludge could be pressed more satisfactorily using an in-line conditioning system when proportions of activated sludge were not high; and, the mixed sludge, after digestion and elutriation, was easily pressed in a short time and gave excellent cakes. (Sandoski-FIRL)
W74-11248

INVERSE SEPARATION OF HEAT-TREATED SLUDGE,
University Coll. of South Wales and Monmouthshire, Cardiff. Dept. of Mechanical Engineering.
C. Rotsides, and J. G. Everett.
Water Pollution Control, Vol 73, No 2, p 210-213, 1974. 6 fig, 7 ref.

Descriptors: *Sludge treatment, *Heat treatment, Air entrainment, Settling, Laboratory tests, *Waste water treatment.
Identifiers: *Floating sludge.

An examination of the problem of floating sludge was undertaken with experiments showing that agitation and air entrainment of heat-treated sludge may play a part in causing sludge to float. It was found that the amount of floating sludge is not influenced by either temperature or period of heat treatment but that solids concentration does have a pronounced effect on the settling of the sludge. Continuous operation of the decanter also may influence sludge floating. (Sandoski-FIRL)
W74-11249

THE EFFECT OF HEAT TREATMENT ON THE SOLUBILIZATION OF HEAVY METALS, SOLIDS AND ORGANIC MATTER FROM DIGESTED SLUDGE,
University Coll. of South Wales and Monmouthshire, Cardiff. Dept. of Mechanical Engineering.
J. G. Everett.
Water Pollution Control, Vol 73, No 2, p 207-209, 1974. 4 tab, 9 ref.

Descriptors: *Heat treatment, *Sludge treatment, *Heavy metals, *Solubility, Nitrogen, Fertilizers, Organic matter, Zinc, Copper, Nickel, Chromium, Lead, Sludge digestion, Solid wastes, *Waste water treatment.

The effect of heat treatment on the solubility of five metals and other digested sludge components has been investigated. Nitrogen was found to be more soluble than most sludge components and metals were found to be the least soluble. This has important implications for the use of the liquor as an agricultural fertilizer. The liquor solids averaged 12 percent of the toxicity of the sludge. For equal applications of nitrogen the liquor was only six percent as toxic as the sludge. (Sandoski-FIRL)
W74-11250

A STUDY OF CONDITIONING SEWAGE SLUDGES WITH LIME,
L. J. Webb.
Water Pollution Control, Vol 73, No 2, p 192-206, 1974. 7 fig, 7 tab, 12 ref.

Descriptors: *Sludge treatment, *Sewage sludge, *Lime, Efficiencies, Investigations, Liquids, Solids, *Waste water treatment.
Identifiers: *Lime conditioning, *Copperas.

The following two project objectives were investigated with respect to lime treatment of sewage sludges: to understand further the mechanism of lime conditioning of sewage sludges with a view to improvements in process efficiency and to compare various lime conditioning systems on a variety of sludge types. Lime with copperas was the most effective conditioning system on typical examples of primary, digested, and activated sludges. There is a much larger variation in the liquid phase lime demand than in the solid phase demand. The great efficiency of lime in conditioning primary sludges is attributed to its interaction with the fat/grease content of the sludge. (Sandoski-FIRL)
W74-11251

FACILITIES FOR CONTROLLING THE ACTIVATED SLUDGE PROCESS BY MEAN CELL RESIDENCE TIME,
Yoder-Trotter-Orlob and Associates, Walnut Creek, Calif.
M. E. Burchett, and G. Tchobanoglous.
Journal Water Pollution Control Federation, Vol 46, No 5, p 973-979, May 1974. 7 fig, 6 ref.

Descriptors: *Activated sludge, *Treatment facilities, *Control systems, Automatic control, Operation and maintenance, *Waste water treatment.
Identifiers: *Mean cell residence time.

Several methods now being used by operators to control the activated sludge process are discussed. The use of the mean cell residence time (MCRT) is recommended as the most suitable operational control parameter. The basic concepts involving the theoretical and practical reasons for controlling the MCRT are discussed. The physical features of a control system developed to use this method are presented. The following advantages for the proposed control system are: minimum required operator attention, inexpensive capital costs, more positive process control, and more stable process operation. (Sandoski-FIRL)
W74-11254

WATER AND EFFLUENT INSTRUMENTATION MADE SIMPLE,
Taylor Instrument Companies, Rochester, N.Y.
For primary bibliographic entry see Field 5A.
W74-11258

SEDIMENTATION: AN INTRODUCTION TO SOLIDS FLUX THEORY,
Sheffield (England). Water Pollution Control Dept.
J. Handley.
Water Pollution Control, Vol 73, No 2, p 230-240, 1974. 10 fig, 17 ref.

Descriptors: Reviews, Design criteria, *Operations, *Sedimentation, Mathematical studies, Theoretical analysis, Application methods, *Waste water treatment.
Identifiers: *Thickeners, *Settling tanks, Solids flux, *Flux theory.

A survey is presented of the basic concepts involved in the design and operation of settlement tanks and thickeners; new theory on sedimentation or thickening is not included. Material normally found in research papers is presented in a way that the practicing designer or operator can grasp the concepts developed. The application of these concepts to the various features of tank design and operation is described. (Sandoski-FIRL)
W74-11261

AEROBIC TREATMENT OF FEEDLOT RUNOFF,
Nebraska Univ., Lincoln. Dept. of Civil Engineering.
Terence J. McGhee, R. L. Torrens, and R. J. Smaus.
Journal Water Pollution Control Federation, Vol 45, No 9, p 1865-1873, Sept, 1973. 4 fig, 7 tab, 14 ref.

Descriptors: *Feed lots, *Agricultural runoff, *Aerobic treatment, *Waste water treatment, Cattle, Farm wastes, Physical properties, Chemical properties, Chemical oxygen demand, Biochemical oxygen demand, Liquid wastes, Sludge.

The feedlot runoff used in this study was obtained from the University of Nebraska. The units were operated at liquid retention times of 1-8 days. The study was conducted at room temperature. It was determined that an aerobic biological system can effectively treat settled feedlot runoff. Reductions of chemical oxygen demand of sixty percent may be obtained. Liquid retention times of three days or more are sufficient to insure satisfactory treatment. The color of the runoff is affected slightly by aerobic treatment. Analysis of chemical oxygen demand is superior to the 5-day biochemical oxygen demand determination in evaluating the efficiency of treatment and the strength of feedlot runoff. (Cartmell-East Central)
W74-11281

CHARACTERISTICS OF ZINC SMELTING INDUSTRIAL WASTE AND SIMULTANEOUS REMOVAL OF TOXIC ELEMENTS AND PHOSPHATES FROM IT,
Indian Defence Lab., Jodhpur.
L. M. Bhandari.
Indian Journal of Environmental Health, Vol 15, No 3, p 236-242, July, 1973. 4 tab, 5 ref.

Descriptors: *Zinc, *Industrial wastes, *Iron, *Effluents, *Waste water treatment, Toxicity, Mills, Hydrogen ion concentration, Chemical precipitation, Toxicity, Phosphates.
Identifiers: *India.

The chemical characteristics of the effluents from zinc smelter at Debari, Rajasthan, India are reported. The effluent was not only toxic due to the presence of metallic and flouride ions, but a high concentration of phosphates also rendered it unsuitable for disposal to the river water. Zinc and iron seem to be the major metallic ions in the waste; their concentrations varied between 120-160 and 35-48 mg/l, respectively. An attempt was made to remove zinc, iron, and phosphates by treating the effluent with sodium hydroxide or lime. The effect of increasing the pH of the effluent on percent removal of zinc and phosphates was studied. Lime seemed to be the most suitable precipitating agent for this effluent. (Jernigan-Vanderbilt)
W74-11354

ASPECTS OF AGRICULTURAL USE OF POTATO STARCH WASTEWATER,
Agricultural Univ., Wageningen (Netherlands). Dept. of Soils and Fertilizers.
For primary bibliographic entry see Field 3F.
W74-11356

HEAVY METAL REMOVAL FROM WASTEWATER TREATMENT PLANT BY CHEMICAL TREATMENT,
C. M. West, W. P. Bonner, and R. B. Bustamante.
28th Annual Purdue Industrial Waste Conference, May 1-3, 1973, Lafayette, Indiana. 33 p, 10 tab, 18 ref.

Descriptors: *Heavy metals, *Wastewater treatment, *Treatment facilities, *Trace metals, Effluents, Tertiary treatment, On-site investigations, Toxicity, Chromium, Nickel, Cadmium, Copper, Lead, Mercury, Sampling, Testing procedures, Analytical techniques, Spectroscopy.

The sewage treatment plant in Cookeville, Tennessee was studied to determine the general quality of the effluent of the plant, with respect to heavy metals, and to determine the effect of the proposed tertiary treatment system on the quality of the effluent with respect to heavy metals. Six heavy metals were chosen for investigations, based on their toxicity and probability of occurrence in these effluents. The metals were chromium, nickel, cadmium, copper, lead, and mercury. Grab samples were taken from the sewage treatment plant effluent in August, 1971, when the flow was approximately 2.0 to 2.5 million gallons per day. Several of these samples showed small amounts of chromium and copper. An occasional sample indicated the presence of cadmium. None of the other heavy metals were detected. Tests were made on a fresh effluent sample taken in April, 1972 to determine: (1) treatment of the effluent with aluminum sulfates; (2) treatment of spiked effluent samples with alum; (3) treatment of spiked effluent samples with pH adjustment and alum; (4) the use of ferrous sulfate as a flocculant; and (5) the use of ferric chloride as a flocculating agent. It was concluded that the quality of the effluent, with respect to solids, could be improved by adjustment of pH and treatment with any one of the coagulants listed above. (Jernigan-Vanderbilt)
W74-11359

SOME EFFECTS OF METALS DISCHARGED IN EFFLUENTS AND POSSIBILITIES FOR THEIR RECOVERY,
Water Pollution Research Lab., Stevenage (England).
J. D. Swanwick, and J. V. O'Gorman.
Chemistry and Industry, p 573-575, June 16, 1973. 29 ref.

Descriptors: Effluents, *Sludge treatment, *Industrial wastes, *Wastewater treatment, Solvent extraction, Metallurgy, Separation techniques, Recycling, Public health, Ion exchange, Reverse osmosis.
Identifiers: Hydrometallurgical processes.

Removal of metals in sewage treatment leads to greatly increased concentrations in sludge. Agriculturalists have found that nickel, copper and zinc have the greatest adverse effects on crop growth. Increased uptake of metals by plants from soil treated with sewage sludge can also affect the health of humans. For these and economic reasons, it is wise to remove metals from sewage sludges, ideally to recover them. The most logical place for recovery is in the industry prior to discharge to the sewer. Thermal or hydrometallurgical processes may be used with the latter preferred for flexibility, rate of recovery, freedom from pollution, and low capital cost. Recovery from sludge may be accomplished by dissolving the waste in acid and applying an appropriate process such as solvent extraction (Cu, Ni, Co, B, etc), ion exchange (Cr, Cu, Zn, Cd, Hg) reverse osmosis (Ni), electrochemical methods, adsorption on activated carbon, or complex formation with polyelectrolytes. (Jernigan-Vanderbilt)
W74-11366

POLLUTION ABATEMENT IN A COPPER WIRE MILL.
Industrial Water Engineering, Vol 11, No 6, p 6, March/April, 1974. 1 tab.

Descriptors: *Copper, *Pollution abatement, *Industrial wastes, Effluents, Water pollution, Chemical precipitation, Metals, *Water reuse, *Recycling, *Waste water treatment, *Electrolysis.

The production of copper wire has always presented numerous pollution problems. The wire had to be 'pickled' and then coated and 'repickled' and rinsed. All of these techniques produced additional pollutants and the costs of treatment were excessive. In an EPA demonstration grant, the Volco Brass and Copper Company demonstrated that water consumption could be reduced by 90% from 200,000gal/d to 20,000gal/d by chemical reuse and water reuse. The sulfuric acid picke was regenerated and high purity metallic copper recovered by continuous electrolysis, thereby eliminating the dumping of spent pickel liquor. Hydrogen peroxide was proven to be an improved secondary pickle and the chromates and fluorides previously used were eliminated. Total solids leaving the plant in the rinse water were reduced from 2500gal/d to less than 100gal/d. Metal losses in the effluent were reduced to less than one pound per day compared to the previous 600-700lb/d. (Jernigan-Vanderbilt)
W74-11383

METHOD AND APPARATUS FOR SEPARATION OF SLUDGE,
FMC Corp., Santa Clara, Calif. (assignee).
F. F. Sako, and S. S. Chandler.
U.S. Patent No 3,833,204, 4 p, 2 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 924, No 1, p 107, July 2, 1974.

Descriptors: *Patents, Liquid wastes, *Sewage treatment, *Activated sludge, *Aeration, Pollution abatement, *Wastewater treatment, Water pollution control, Water quality control, Electrodes, Separation techniques.

Liquid waste entering the activated sludge plant, after screening, comminuting, degritting and primary clarification, flows into an aeration basin. The mixed liquor discharged from the aeration zone is fed into a chamber for separation and densification of sewage sludge. This chamber is provided with electrodes. A difference of potential is imposed across the respective electrodes and current is passed in quantities to decompose water and produce fine bubbles of hydrogen and oxygen which rise in a dispersed form through the aqueous medium. As the sludge material is contacted by and has bubbles of gas adhered or occluded to it, a definite profile or lower limit of sludge blanket materializes. Effluent of acceptable quality can be discharged from any level intermediate the bottom of the sludge blanket being maintained by the rising bubbles and the electrodes. (Sinha-OEIS)
W74-11397

BIOTREATMENT PROCESS,
Sterling Drug, Inc., New York. (assignee).
A. H. Erickson, E. M. Pogainis, and G. H. Teletzke.
U.S. Patent No 3,824,186, 3 p, 1 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 924, No 3, p 631, July 16, 1974.

Descriptors: *Patents, *Wastewater treatment, *Aeration, *Biochemical oxygen demand, *Biological treatment, *Sewage treatment, Pollution abatement, Water pollution control, Water quality control, Dewatering, Organic wastes.

The method is achieved by feeding liquors to an aeration vessel containing a previously acclimated biological sludge, the loading rate of the liquors to the aeration vessel being between 1.0 and 5.0kg of biological oxygen demand per kg of mixed liquor volatile suspended solids. Then the mixture in the vessel is agitated for a period in excess of two hours with an oxygen containing gas while a dissolved oxygen content is maintained sufficient to support aerobic biological growth. The next step is to pass the mixture to a settling tank to separate accumulated biological sludge; recycle the settled biological sludge to the aeration tank; and remove from the aeration tank biological sludge at a rate approximately equivalent to the rate of accumulation of the biological sludge. (Sinha-OEIS)
W74-11398

AMMONIA ELIMINATION SYSTEM,
Environmental Protection Agency, Washington, D.C. (assignee).
D. H. Caldwell, and E. F. Barth.
U.S. Patent No 3,824,185, 4 p, 1 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 924, No 3, p 631, July 16, 1974.

Descriptors: *Patents, *Wastewater treatment, Water pollution control, Water quality control, Nitrogen, Ammonia, *Nitrification, *Denitrification, *Biological treatment, Nitrobacter sp, Nitromonas sp.

Air stripping is combined with biological nitrification and denitrification. The procedure involves air stripping the main flow waste water stream. However, rather than discharge the ammonia laden air to the atmosphere, the air thereafter passes through an ammonia absorber where the ammonia content is absorbed into an aqueous side stream. The ammonia absorber constitutes also a biologic reactor in which nitrifying organisms, Nitrobacter species and Nitromonas species, present on adsorber surfaces and in the absorber water convert ammonia to nitrate and nitrite. The process serves to transfer the dilute ammonia nitrogen originally present in the waste water into a concentrated nitrate/nitrite absorber product stream, then to convert the nitrate/nitrite to nitrogen gas which can be safely discharged to the atmosphere. (Sinha-OEIS)
W74-11399

DEVICE AND APPARATUS FOR TREATING LIQUIDS SUCH AS DRINKING WATER AND WASTE WATER,
Societe Industrielle du Traitement des Liquides et des Gaz, La Courneuve (France).
P. Chapsal.
U.S. Patent No. 3,823,923, 4 p, 4 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 924, No 3, p 569, July 16, 1974.

Descriptors: *Patents, *Waste water treatment, *Ozone, Pollution abatement, Water quality control, Bubbles, Potable water, Equipment, Water treatment.

The device comprises a tube which is immersed in liquid in a tank and communicates at its upper end with treating gas-supply means. A diffuser having radial vanes fixed to a rotating disc communicates with the lower end of the tube. A pump which is under and coaxial with the diffuser pumps the liquid from the tank through passages in the disc into chambers defined by the vanes so as to form in the chambers an emulsion of the gas and liquid which is thereafter ejected into the liquid in the tank. (Sinha-OEIS)
W74-11403

WATER TREATMENT FILTER BED FOR SEWAGE SYSTEMS,
J. L. Bergles, and M. A. Nelson.
U.S. Patent No 3,823,825, 3 p, 2 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 924, No 3, p 543, July 16, 1974.

Descriptors: *Patents, *Water treatment, *Filtration, *Sewage treatment, *Waste water treatment, Pollution abatement, Water pollution control, Water quality control, Tile drains, Treatment facilities, Equipment.

The trickle type water treatment filter bed has an absorption bed formed in the ground in which gravel is placed. A drain tile extends throughout the bed for conducting water from the sewage treatment plant and throughout the length of the bed. A drain wall is located in the ground and spaced a short distance from the absorption bed. The drain wall is formed at a depth lower than the depth of the absorption bed. It prevents surface and ground water from running into the absorption bed and thereby overloading the latter. It also functions to drain excessive sewer water from the absorption bed itself. (Sihna-OEIS)
W74-11405

PROCESS FOR TREATING WATER,
Economic Development Corp., Battleboro, Vt.
M. E. McLaughlin.
U.S. Patent No 3,823, 767, 10 p, 4 fig, 2 tab, 3 ref; Official Gazette of the United States Patent Office, Vol 924, No 3, p 529, July 16, 1974.

Descriptors: *Patents, *Waste water treatment, *Dissolved oxygen, *Cooling water, *Thermal pollution, *Aeration, Pollution abatement, *Sewage treatment, Water pollution control, Reservoirs, Oxygenation, Powerplants.

The process includes storing water in a reservoir at a selected height above the level of the body of water, periodically releasing specified quantities of water from the reservoir at a point below the level and in an upward direction toward the surface and into the body of water. The upward direction of the released water is accomplished by releasing the water against a deflector located near the base of the reservoir. The released water forms a translatory wave in the body of water and as it moves away from the reservoir, it breaks causing effective mixing of air and water, cooling the water and increasing the oxygen content of the water. This action accomplishes excellent mixing of air and water and where solid particles are present, breaking and pulverizing of the particles. The invention pertains to cooling water effluent from power generating stations to prevent thermal pollution of natural bodies of water. In another embodiment it pertains to a more efficient method of aerating and treating sewage. (Sinha-OEIS)
W74-11406

POLLUTED WATER PURIFICATION,
Phillips Petroleum Co., Bartlesville, Okla.
E. O. Box, Jr., and J. Farha, Jr.
U.S. Patent No 3,823,088, 5 p, 6 tab, 5 ref; Official Gazette of the United States Patent Office, Vol 924, No 2, p 342, July 9, 1974.

Descriptors: *Patents, *Water purification, *Catalysts, *Oxidation, Water pollution treatment, Pollution abatement, *Waste water treatment, Metals, Organic wastes.
Identifiers: Zinc aluminates.

Organically polluted waters are purified by contacting with a catalyst such as zinc aluminate and promoted with at least one metal active for initiating oxidative reactions in the liquid or gaseous phase under oxidizing conditions. Zinc aluminate can be prepared using any conventional method of preparation which will provide a solid material having a surface area of at least about one square meter per gram. One particularly suitable method is to intimately blend a mixture of aluminum oxide and zinc oxide, in essentially stoichiometric proportions, followed by a calcination step wherein the mixture is heated in air at temperatures of 1500-2200 deg F. Prior to the calcination, the mixture can be formed into conventional catalyst shapes such as pellets, extrudates, agglomerates, and the like. Some or all of the zinc aluminate can be in the spinel form. The process is particularly applicable for feeds in which the organic materials are hydrocarbons and/or oxygenated hydrocarbons. In vapor phase operation, the temperatures can be 600-1200 deg F., preferably 900-1000 deg F., and at any convenient pressure which will permit operation in the vapor phase. In liquid phase operation, the temperature within the reaction zone will generally be 350-550 deg F., preferably 400-500 deg F., and under a sufficient pressure to maintain a liquid phase within the reaction zone. (Sinha-OEIS)
W74-11407

ACID MINE WATER TREATMENT PROCESS,
Kettering Scientific Research, Inc., Yellow Springs, Ohio.
R. W. Treharne, and D. E. Wright.
U.S. Patent No 3,823,081, 3 p, 3 fig, 1 tab, 3 ref; Official Gazette of the United States Patent Office, Vol 924, No 2, p 341, July 9, 1974.

Descriptors: *Patents, *Acid mine water, *Waste water treatment, Pollution abatement, Water pollution control, Water quality control, *Water purification, *Water treatment, Electrolysis, Potable water.
Identifiers: Iron hydroxide precipitate, Sulfuric acid.

A process for electrolytically converting acid mine water to potable drinking water having a neutral pH and a negligible iron content is claimed. The electrolytic cell treatment process has a cathode compartment wherein the pH of the acid mine water is driven basic and an iron hydroxide precipitate is formed. A sand barrier separates the cathode compartment from the anode compartment. In the anode compartment the pH is driven more acidic as sulfuric acid is concentrated. Electrolytic hydrogen evolved in the cathode compartment and electrolytic oxygen evolved in the anode compartment are possible by-products as are the sulfuric acid produced and iron from the iron precipitate produced. Alternatively, the evolved hydrogen and oxygen may be used within the electrolytic system to increase the efficiency. (Sinha-OEIS)
W74-11408

SEWAGE FLOCCULATING AND SEDIMENTATION TANK UNIT,
Johnson Construction Co. A. B. Solna (Sweden).
K. R. Dunkers, and J. H. Johansson.
U.S. Patent No 3,822,788, 4 p, 2 fig, 15 ref; Official Gazette of the United States Patent Office, Vol 924, No 2, p 268, July 9, 1974.

Descriptors: *Patents, *Flocculation, *Sedimentation, *Sewage treatment, Pollution abatement, *Waste water treatment, Equipment, Treatment facilities, *Settling basins.
Identifiers: Clarification.

A rectangular tank consists of two sections, a flocculating section and a sedimentation section. Compartments are formed in each of the sections to substantially and uniformly distribute the incoming sewage and length of the tank. Outlets at the bottom of each of the flocculating sections open into the sedimentation section to guide the sewage from the flocculating section in a direction perpendicular to the longitudinal axis of the tank and upward towards the outlet weir for discharge as clarified water. The sewage is agitated in each of the flocculating compartments. The deposited sludge is collected and transported by a suction device. (Sinha-OEIS)
W74-11410

APPARATUS FOR TREATING AND PURIFYING SEWAGE, PARTICULARLY SEWAGE CONTAMINATED WITH DETERGENTS,
K. Marschall.
U.S. Patent No 3,822,786, 3 p, 1 fig, 12 ref; Official Gazette of the United States Patent Office, Vol 924, No 2, p 267, July 9, 1974.

Descriptors: *Patents, *Ozone, *Detergents, *Sewage treatment, Pollution abatement, *Waste water treatment, Water pollution control, Sedimentation, Flocculation, Water purification, Activated carbon, Filters.

Sewage purification apparatus includes an ozonizing container in which the sewage is recirculated and purified by contact with ozone at substantially atmospheric pressure after passing through a separator container where oil, grease, fat, and solvents are separated and a reaction container where dirt and colloidal matter sedimented by a flocculating agent are removed. The purified water withdrawn from the ozonizing container passes through an activated carbon filter where residual ozone in the water is converted into oxygen, and the gases in the upper portion of the ozonizing container pass through an activated carbon filter where surplus ozone is converted to oxygen before the gases escape to the atmosphere. (Sinha-OEIS)
W74-11411

SEWAGE TREATMENT PLANT EQUIPPED WITH AN AERATION IMPELLER,
J. R. Kaelin.
U.S. Patent No 3,820,764, 3 p, 4 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 923, No 5, p 1811, June 28, 1974.

Descriptors: *Patents, *Sewage treatment, *Waste water treatment, *Aeration, Pollution abatement, Water pollution control, Water quality control, Treatment facilities.

The sewage treatment plant comprises a basin and a motor driven aerator. The aerator is supported at least at three points. Two supports extend laterally from a platform with at least that portion of each support adjacent to the platform being inclined downward and outward at an angle of less than 45 degrees to the horizontal and to the surface of liquid in the basin. The third support element constitutes a bridge or walkway which connects the aerator with the basin rim or edge. (Sinha-OEIS)
W74-11415

UNDERWATER SEWAGE COLLECTION SYSTEM FOR DOCKED BOATS,
H. E. Johnson.
U.S. Patent No 3,820,488, 7 p, 7 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 923, No 5, p 1737, June 28, 1974.

Descriptors: *Patents, *Waste water treatment, *Pollution abatement, *Water pollution control, Sewage disposal, Boats, Equipment.
Identifiers: *Sewage collection.

A system is designed to permit the sewage from a boat or ship to be conducted directly to a collection and storage area. The connection comprises a manifold defining a hollow chamber having two sets of inlets and outlets. A float valve associated with the second inlet permits water flow into the manifold but prevents escape of sewage. The sewage from the boat is flushed through the sewage outlet port into the manifold where such sewage is swept with the water into the conduit means for conduction to the sewage receiving and storage equipment. (Sinha-OEIS)
W74-11416

APPLICATION OF BIOLOGICAL FILTERS IN WATER TREATMENT SYSTEMS.
NASA Tech Brief, B73-10404, November, 1973.

Descriptors: Bacteria, *Filters, *Bactericides, Equipment, Water treatment, *Filtration, *Waste water treatment, *Biological treatment.
Identifiers: *Silver iodide.

Regular bacteria filters tend to accumulate bacteria and, when nutrients become available, the bacteria increase exponentially, which increases the possibilities of a breakthrough. Present effective lifetime of most filters is about 10 days. If a bactericide is used to kill bacteria near the filter, the lifetime of the filters can be extended. Silver chloride placed on or close to the barrier will kill the bacteria as they arrive. Dead bacteria accumulate linearly rather than increasing exponentially and hence filter life can be extended up to 30 days. (Shaffer-FIRL)
W74-11418

CONTROL OF SULFUR OXIDE POLLUTION FROM POWER PLANTS,
National Environmental Research Center, Research Triangle Park, N.C.
For primary bibliographic entry see Field 5G.
W74-11431

THE COANDA-EFFECT OIL-WATER SEPARATOR: A FEASIBILITY STUDY,
Naval Civil Engineering Lab., Port Hueneme, Calif.
D. Pal.
Available from NTIS, Springfield, Va., 22161 as AD-774 080, Price $3.25 printed copy; $2.25 microfiche. Technical Note 1331, February 1974. 35 p, 20 fig, 2 tab, 4 ref, 2 append.

Descriptors: *Oily water, *Waste water treatment, *Oil pollution, *Ships, *Separation techniques, Jets, Boundary processes, Boundaries(Surfaces).
Identifiers: *Coanda effect.

An experimental investigation which establishes the feasibility of using the Coanda effect in developing an oil-water separator is described. Tests conducted on an experimental model with an oil-water mixture containing 6% oil showed that the oil content in the effluent can be reduced to less than 3%. A three-stage separator produced effluent in the range of 1%. Conceptual designs of a practical separator are discussed. The space requirement for a Coanda-effect separator when compared with typical parallel-plate type separators of the same capacity is considerably smaller. Analytical expressions useful in designing a Coanda-effect separator of a given size are also given.
W74-11436

5E. Ultimate Disposal Of Wastes

DIGESTION BYPRODUCT MAY GIVE ANSWER TO ENERGY PROBLEM,
Knoerle, Bender, Stone and Associates, Chicago, Ill.
For primary bibliographic entry see Field 5D.
W74-10935

VACUUM FILTRATION OF SLUDGE,
Corsicana Water Utilities, Tex.
For primary bibliographic entry see Field 5D.
W74-11084

USE OF THE MULTIROLL PRESS FOR DEWATERING CLARIFIER SLUDGE,
Waplans Mekaniska Verkstads A.B., Vaplan (Sweden).
For primary bibliographic entry see Field 5D.
W74-11096

OCEAN INCINERATION OF TOXIC WASTES.
Public Works, Vol 105, No 4, p 46-47, April, 1974.

Descriptors: *Hydrocarbons, Toxicity, *Incineration, *Oceans, Burning, Ships, Hydrochloric acid, Marine animals, *Waste treatment.
Identifiers: *Toxic wastes, *Ocean incineration, Combustion chambers, Vulcanus.

Chlorinated hydrocarbons and other toxic wastes may be destroyed by a new method, incineration at sea. A converted German cargo vessel was specially constructed so that its combustion chambers may take toxic wastes from British, Dutch, and Scandinavian companies. An American counterpart is proposed for 1975. The ship reduces the cost of incineration to nearly one half that of land incineration. Chlorinated hydrocarbon wastes are disposed of by incineration at 1400C. This temperature consumes 99 percent of the materials; fumes settle in the ocean and are converted into mild hydrochloric acid, which can be absorbed into the marine life without harm. Burning is done in combustion chambers in the rear of the ship and fumes fall astern into the wake. Burning in the North Sea is done fifty to sixty miles away from the nearest coastline, and clear of shipping lanes. Disposal is checked for conformance to government regulations after each trip. (Prague-FIRL)
W74-11132

THREE TONS IS ALL YOU GET.
Western Dairy Journal, Vol 29, No 8, p 12-13, June, 1973. 2 fig.

Descriptors: *Farm wastes, *Dairy industry, *Waste disposal, *Legal aspects, Cattle, Costs, Water Quality Control, Transportation, *California, Regulation.
Identifiers: *Manure.

A decision by California's Santa Ana Regional Water Quality Control Board states: The discharge of manure waste to lands owned or controlled by the discharger (dairyman) shall not exceed three tons (dry weight) per acre per year. The amount figures to the equivalent of 1.5 times the amount of manure produced by one cow in one year. The dairymen assume that if they can't put the manure on their own property, they must haul it away. But transportation and a place to haul it will be a problem. Also, the decision raises costs and could prevent dairymen from expanding herds to pay for those increases. The newest order requires a dairymen to report any increase in the number of animals by 25% or 100 head-whichever is smaller. (Cartmell-East Central)
W74-11237

SOIL COLUMNS FOR SIMULATING ANIMAL MANURE RECYCLING,
McGill Univ., Montreal (Quebec). Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5D.
W74-11242

MORE BEEF ON THE HOOF GOAL OF OHIO RESEARCH.
For primary bibliographic entry see Field 5D.
W74-11244

POULTRY ANAPHAGE IS HERE TO STAY,
Michigan State Univ., East Lansing. Coll. of Agriculture and Natural Resources.
For primary bibliographic entry see Field 5D.
W74-11246

5F. Water Treatment and Quality Alteration

INSPECTION OF NEW TREATMENT FACILITIES, THE ROCKVILLE WATER AND AQUEDUCT COMPANY,
Rockville Water and Aqueduct Co., Conn.
W. N. MacKenzie.
Journal of the New England Water Works Association, Vol 88, No 1, p 1-18, March, 1974.

Descriptors: *History, Organic wastes, Wastes, Water quality, Wastewater treatment, Potable water, Lakes, *Connecticut, *Treatment facilities, Water treatment, *Water pollution control.
Identifiers: Rockville(CT), Lake Snipsic.

The history of the Rockville Water and Aqueduct Company of Rockville, Connecticut is presented. A chronological summary of construction and events dating back almost 150 years is presented including a list of people important to the development of the company. The company was organized under a charter granted in April, 1893 as a result of the merger of the Rockville Water Power Company and Rockville Aqueduct Company. The company was concerned with controlled water pollution as early as 1907 when Lake Snipsic and its tributaries were examined for sources of pollution. The company acquired additional land for the sole purpose of protecting from pollution the drinking water supplied to the city. Anti-pollution rules were established in 1911 for those using the lake shore front. Organic wastes and refuse matter were forbidden to be deposited in the lake. (Merritt-FIRL)
W74-10909

DIRECT-FILTRATION STUDIES FOR METROPOLITAN TORONTO,
Proctor and Redfern, Toronto (Ontario).
For primary bibliographic entry see Field 5D.
W74-10928

ANDOVER GIVES SHOT TO SUPPLY,
Massachusetts Dept. of Public Works, Andover.
R. E. McQuade, and C. E. Fuller.
Water and Wastes Engineering, Vol 11, No 5, p 32-37, May, 1974. 11 fig.

Descriptors: *Water treatment, *Municipal water, *Treatment facilities, *Design criteria, *Costs, Filtration, Construction, Engineering, Water supply, *Massachusetts, Water supply, Potable water.
Identifiers: Public works, Andover(Mass).

Andover, Massachusetts recently completed construction of a new drinking water filtration plant with an ultimate capacity of 24 mgd. The plant currently draws water from Haggets Pond to supply the town's 24,000 residents and commercial and industrial users. In the future it is planned to augment this supply by drawing water from the Merrimack River. Included are the costs breakdown of building as well as basic design data, equipment used in the plant, and estimated operating costs for 1974. (Shaffer-FIRL)
W74-10944

APPLICATION OF MONITORING TECHNOLOGY (FOR ASSURING) DRINKING WATER QUALITY,
National Sanitation Foundation, Ann Arbor, Mich.
N. I. McClelland, J. R. Adams, R. R. Wood, and K. H. Mancy.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 54-55, 1974.

Descriptors: *Monitoring, *Water quality, *Automation, Data collections, Data processing, Municipal water, *Potable water.

Sensor systems were combined with newly developed automated electrochemical techniques in a mobile, computerized potable-water monitoring laboratory. Eighteen parameters are included in the system: temperature (thermistor); pH and alkalinity (glass electrodes); conductivity (a-c conductivity cell); turbidity (nephelometer); dissolved oxygen (voltammetric membrane electrode); chlorides, free and total fluorides, nitrates, and hardness (ion selective electrodes); free and total residual chlorine (galvanic cell); copper, cadmium, and lead (differential anodic stripping voltammetry); corrosion (polarization admittance technique); and deposition rate (calcium carbonate deposition test). (See also W74-10947)
W74-10960

AN AMPEROMETRIC MEMBRANE HALOGEN ANALYZER,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 5A.
W74-10980

TRACE ORGANIC CONTAMINANTS IN DRINKING WATER; EVALUATION OF SEMI-PERMEABLE MEMBRANES AND OSMOTIC PUMPING TO ACHIEVE CONCENTRATION,
Gulf South Research Inst., New Orleans, La.
I. Cabasso, E. Klein, C. Eyer, and J. Smith.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 204-210, 4 tab, 7 ref.

Descriptors: Water analysis, *Membrane processes, *Potable water, Chemical analysis, Separation techniques, Analytical techniques, *Pollutant identification, Membranes, Reverse osmosis, *Organic compounds, *Water treatment, *Semipermeable membranes.
Identifiers: Trace organic compounds.

Concentration and retention for analysis of trace organic chemicals found in water were studied using membranes which are impermeable to organics and which are highly permeable to water. Three polymeric membranes were chosen for this study; two are asymmetric membranes of cellulose acetate and ethyl cellulose, and the third is a thin barrier coating polyethyleneimine condensate formed with toluene isocyanate in situ on a polysulfone porous support. The solute concentration in water was in the range of 100-1,000 ppm. Rejections were found to be significantly higher for the polyurea membrane than for the cellulosic derivatives. In general, rejection coefficients for ionizable species were much higher than those for the nonionizable ones. (See also W74-10947) (Knapp-USGS)
W74-10981

TRACE ORGANIC CONTAMINANTS IN DRINKING WATER; THEIR CONCENTRATION BY REVERSE OSMOSIS,
National Environmental Research Center, Cincinnati, Ohio.
M. Dienzer, R. Melton, D. Mitchell, F. Kopfler, and E. Coleman.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 211-217, 1974. 1 fig, 2 tab, 8 ref.

Descriptors: *Water analysis, *Membrane processes, *Potable water, Chemical analysis, Separation techniques, Analytical techniques, *Pollutant identification, Membranes, *Reverse osmosis, *Organic compounds, *Water treatment.
Identifiers: *Trace organic compounds.

A reverse osmosis method was developed for concentrating trace organic compounds in large volumes of water. Organic chemicals of sufficiently high molecular weights, arbitrarily defined as greater than 200, will diffuse very poorly through the membrane and will tend to be rejected, irrespective of their membrane solubilities. Compounds of low molecular weights with minimal spatial requirements but of poor membrane solubility will also be rejected. (See also W74-10947) (Knapp-USGS)
W74-10982

CATION-EXCHANGE REMOVAL OF COPPER FROM AMMONIACAL AQUEOUS SOLUTION,
Australian Atomic Energy Commission Research Establishment, Lucas Heights.
For primary bibliographic entry see Field 5D.
W74-11027

THE PERFORMANCE OF POWDERED ION-EXCHANGE RESINS,
Australian Atomic Energy Commission Research Establishment, Lucas Heights.
For primary bibliographic entry see Field 5D.
W74-11028

SPECIAL WATER FOR SPECIAL PAPER.
Rohm and Haas Reporter, Vol 32, No 1, p 15-17, Spring 1974. 4 illus.

Descriptors: *Industrial water, *Water treatment, *Boiler feed water, *Pulp and paper industry, *Water purification, *Water softening, *Ion exchange, Resins, Europe, Electric insulation, Water supply.
Identifiers: Amberlite ion-exchange resins, *Finland, Electrical papers, Capacitor paper, Dielectric papers.

Two Finnish paper mills use Amberlite ion-exchange resins for purification, especially deionization, of the process water supply needed in the manufacture of contaminant-free kraft pulps for use in electric insulation papers. Kemi Oy. in Karihaara near the Arctic Circle uses three separate water treatment lines, each comprising two large columns of mixed-bed ion-exchange resins. A similar installation is used for softening of boiler feed water supplied to the mill's power plant. In the vicinity of Helsinki in southern Finland, Tervakoski Oy. uses four trains, each comprising one cation-exchange, one weak and one strong anion-exchange, and one mixed-bed unit, to supply high-purity water needed in the manufacture of capacitor tissues and similar electrical papers. (Witt-IPC)
W74-11113

POLYELECTROLYTES AS PRIMARY COAGULANTS FOR POTABLE WATER SYSTEMS,
Topeka Water Dept. Kans.
C. N. Robinson, Jr.

Journal of the American Water Works Association, Vol 66, No 4, p 252-257, April, 1974. 6 fig, 6 tab.

Descriptors: Model studies, *Clarification, Treatment facilities, *Polyelectrolytes, Pilot plants, Laboratory studies, Lime, Coagulants, Polymers, Chlorine, Alum, Costs, Potable water, *Kansas, Electrolytes, *Water treatment, *Wastewater treatment, Water purification.
Identifiers: Kansas River(KS).

After observing conventional treatment processes through several seasonal changes in characteristics of the turbid Kansas River it was concluded that improvement in methods of clarification is warranted. Conventional purification includes chemical lime-soda ash process causing turbidity and subsequent chlorination, coagulation with aluminum sulfate (alum), and coagulant aids such as activated silica. Disadvantages are found in each; suspended solids content in the Kansas River requires chemical treatments, each with additional problems. By pilot plant and laboratory investigations over a two year period on the river, polyelectrolytes were shown to be much more effective than the standard coagulants. Polymer basins promote methods of separating the mud fom the chemical sludge. In addition, it is simpler to treat water of lower turbidity which has not artificially hardened with chlorine and alum. Economic advantages also result from this treatment method. (Prague-FIRL)
W74-11117

MARKETS FOR CHEMICALS GROW AND GROW,
Cleveland State Univ., Ohio.
For primary bibliographic entry see Field 5D.
W74-11118

PLASTIC VALVES STAND UP TO CHLORINE.
The American City, Vol 89, No 5, p 85-86, May, 1974.

Descriptors: *Plastics, *Water treatment, *Costs, *Valves, Chlorine, Municipal water, Treatment facilities, Filtration, Wastewater treatment, *Ohio.
Identifiers: *Ball valves, Plastic valves, Cleveland(OH), Full-flo ball valves, Sodium hydrochlorite.

In a municipal water treatment plant, plastic valves have several advantages over metal ones. These include lower cost; they do not seize or gall; they are unaffected by sodium hypochloride and do not corrode; and they do not experience storm leakage. At the Baldwin Treatment Plant in Cleveland, Ohio, thirty 1/4 inch and two 1 1/2 inch plastic ball valves have been used for two years without leakage or maintenance problems. Polypropylene and PVc Full-Flo ball valves were judged best for their system. (Prague-FIRL)
W74-11123

THE DIRECT REUSE OF RECLAIMED WASTEWATER: PROS, CONS, AND ALTERNATIVES,
Carollo (John) Engineers, Walnut Creek, Calif.
For primary bibliographic entry see Field 5D.
W74-11153

ALGAE CONTROL IN WATER SUPPLY RESERVOIRS,
Southern Illinois Univ., Carbondale.
C. B. Muchmore.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-226 275. Illinois Institute for Environmental Quality Report No IIEQ 73-9, July 1973. 34 p, 90 ref. 20.036.

Descriptors: *Algal control, *Water supply, *Reservoirs, Copper sulfate, Algicides, Illinois, Nutrients, Biological treatment, Intakes, Destratification, Aeration, Ultrasonics, Hardness(Water), Rotifers, Viruses, Chemcontrol, Application methods, Environmental effects, Bottom sediments.

Various methods of algal growth control (nutrient control, biological control, water intake location, destratification, light exclusion, ultrasonic radiation, and alternative algicides) were compared with the copper sulfate method. The most direct and environmentally desirable solution in water supply reservoirs is control of critical nutrients input. A literature search, questionnaires to each state agency responsible for water supplies, and contacts with individuals actively pursuing research in the area of algal growth control revealed that a generally applicable method more environmentally desirable than copper sulfate application has not been found. In evaluating copper levels that are safe for fish and other aquatic organisms, the extreme variability in toxic limits depend on the physical and chemical characteristics of the water. Copper is most toxic in soft waters. Hard waters, common in Illinois, cause rapid precipitation of the added copper as hydroxide and/or carbonate, thus greatly reducing toxic effects. The potential exists for ecological harm due to buildup of copper in bottom muds of reservoirs and streams fed by reservoirs that receive copper sulfate over extended periods of time. However, studies reported in the literature generally have failed to demonstrate that aquatic organisms have been affected by copper buildup in the sediment. (Auen-Wisconsin)
W74-11165

HYGIENIC EVALUATION OF A PORTABLE ION EXCHANGE FILTER FOR FIELD PURIFICATION OF DRINKING WATER, (IN RUSSIAN),
Kiev Research Inst. of General Communal Hygiene (USSR).
G. I. Panasenko, and N. I. Omel'Yanets.
Gig Sanit. Vol 37, No 7, p 108-109, 1972, Illus.

Descriptors: *Potable water, *Cytological studies, *Filters, Disinfection.
Identifiers: Carcinoma, Ion exchange filter, Hep-2 cells, KB cells.

A new PIF type portable ion exchange filter with ion exchange resin and biologically active fiber material reduced the coloration and the oxidizability of raw water by 2-3 X, and had no harmful effect on rats and on cell cultures (human epidermoid carcinoma (HEP-2) and human nasopharyngeal carcinoma (KB) cells). The ion exchange filter is suitable for the field purification of drinking water provided that additional disinfection is applied.--Copyright 1974, Biological Abstracts, Inc.
W74-11175

STATE OF TEETH IN CHILDREN IN THE FOCUS OF ENDEMIC FLUOROSIS, (IN RUSSIAN),
Central Research Inst. of Stomatology, Moscow (USSR).
A. I. Rybakov, and G. V. Baziyan.
Stomatologiya. Vol 51, No 1, p 42-48. 1972. Illus. English summary.

Descriptors: *Fluorides, Public health, Potable water.
Identifiers: Children, Fluorosis, Kolomna(USSR), Teeth.

Data from a mass stomatological examination of children born and living in the focus of endemic fluorosis of Kolomna, USSR and of those in a control district of the same town where there is an optimal fluoride content in the drinking water were compared. The intensification of the fluoride influence on the milk teeth with increase of its concentration in the drinking water and an absence of effect on permanent teeth were revealed. This was probably due to differences in the degree of maturity of enamel of milk and permanent teeth directly after their dentition. Studies were made of the spread of dental fluorosis of different degrees of severity in preschool children and schoolchildren and the incidence of disorders of separate teeth. A computer study of stomatological examinations of 1741 children (10-17 yr old) established a relationship between the spread of dental fluorosis, the time of birth and the injurious effect of fluoride during the first yr of life. The canine teeth and second molars were most often affected. Teeth on the mandible were less often affected by fluorosis.--Copyright 1974, Biological Abstracts, Inc.
W74-11180

HYGIENIC STANDARDIZATION OF THE PERMISSIBLE URANIUM CONTENT IN DRINKING WATER, (IN RUSSIAN),
Nauchno-Issledovatelskii Institut Gigieny, Moscow (USSR).
For primary bibliographic entry see Field 5A.
W74-11185

FIELD EXPERIENCE IN THE SANITARY-HYGIENIC CONTROL OF PIPE LINES IN THE WATER SUPPLY SYSTEM, (IN RUSSIAN),
Gorkovskii Meditskinskii Institut (USSR). Dept. of Hygiene.
V. L. Suslikov, and V. G. Georgiev.
Gig Sanit. Vol 37, No 9, p 89-90, 1972.

Descriptors: *Pipelines, Chlorination.

Improvement of sanitary control over the water distribution system, including strict control over accident-repair work on city mains by sampling and additional chlorination if necessary, reduced the number of spot checks which did not meet bacteriological standards.--Copyright 1974, Biological Abstracts, Inc.
W74-11186

INVESTIGATIONS ON THE VIABILITY OF TRICHOMONAS VAGINALIS IN TAP WATER AND PUBLIC SWIMMING POOLS, (IN RUSSIAN),
Bonn Univ. (West Germany). Institut fuer Medizinische Parasitologie.
For primary bibliographic entry see Field 5B.
W74-11193

FLOCCULATION OF AQUEOUS QUARTZ SUSPENSIONS WITH NEUTRAL AND CATIONIC POLYMERS IN THE PRESENCE OF CO(II), CA(II), OR FE(III),
Natal Univ. Pietermaritzburg (South Africa). Dept. of Science.
For primary bibliographic entry see Field 5D.
W74-11235

APPLICATION OF BIOLOGICAL FILTERS IN WATER TREATMENT SYSTEMS.
For primary bibliographic entry see Field 5D.
W74-11418

5G. Water Quality Control

THE DETERMINATION OF ZONES OF INTENSE CONTRIBUTION TO STREAM FLOW AS RELATED TO THE CONCEPT OF PARTIAL AREA CONTRIBUTIONS,
Maryland Univ., College Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2A.
W74-10904

INSPECTION OF NEW TREATMENT FACILITIES, THE ROCKVILLE WATER AND AQUEDUCT COMPANY,
Rockville Water and Aqueduct Co., Conn.

For primary bibliographic entry see Field 5F.
W74-10909

RIVER AVON COULD CONSIST LARGELY OF SEWAGE EFFLUENT.
Water and Wastes Treatment, Vol 17, No 1, p 13, January, 1974.

Descriptors: Water supply, *Water supply development, Water resources development, Rivers, Reservoirs, *Sewage, Effluents, *Water quality control, Groundwater resources.
Identifiers: *United Kingdom(River Avon), Bristol Avon River Authority(UK).

The report of the Bristol Avon River Authority warning that the River Avon could consist largely of sewage effluent is discussed. Water supplies are not limitless and the rising demand, which stems from increased per capita usage as well as population growth, could not only outstrip supply but also have a disastrous effect on the River Avon system. There are two solutions: water can be imported from other areas or local resources can be developed by river regulation and developing and optimizing groundwater resources. Future public water supply needs which by the year 2001 will exceed present resources by 66 million pgd can be met by constructing a new reservoir. (Merritt-FIRL)
W74-10911

THE PRINCIPLES OF SUBSTANTIATING PERMISSIBLE CONCENTRATIONS OF RADIOACTIVE SUBSTANCES IN FRESHWATER BODIES (PRINTSIPY OBOSNOVANIYA DOPUSTIMYKH KONTSENTRATSIY RADIOAKTIVNYKH VESHCHESTV V VODE PRESNOVODNYKH VODOYEMOV),
A. N. Marey, and R. M. Barkhudarov.
Gigiena i Sanitariya, No 1, p 50-54, 1974. 2 tab, 2 ref. English summary.

Descriptors: *Radioisotopes, Freshwater, Potable water, Food chains, Surface waters, Lethal limit, Path of pollutants, *Water quality standards, Legal aspects.
Identifiers: *Radiation doses, *USSR.

Permissible irradiation doses for man accepted by the national sanitary law were assumed as base in the standardization of radioactive isotopes in water bodies. The entry of radioactive isotopes into the body of a man with drinking water, their migration from the water body by the food chains, and the action of ionizing radiation from the surface of the water body and the flood lands were considered. (Merritt-FIRL)
W74-10912

STORM DRAINAGE SYSTEMS DESIGN MADE ADAPTABLE FOR COMPUTERS,
Austin Co., Roselle, N.J. Civil - Structural Dept.
For primary bibliographic entry see Field 4A.
W74-10916

A NEW NATURAL FACTOR IN THE SELF-PURIFICATION OF WATER BASINS (A VIZTAROLOK ONTISZTULASANAK UJ TERMESZETES TENYEZOJE),
For primary bibliographic entry see Field 5C.
W74-10922

PURE WATERS PROJECT INCLUDES RESTORATION,
For primary bibliographic entry see Field 5D.
W74-10926

ARTIFICIAL AQUIFER STOPS STORM POLLUTION.
For primary bibliographic entry see Field 5D.
W74-10929

A FIELD TRIAL OF ABATE LARVICIDE FOR THE CONTROL OF AEDES AEGYPTI IN BANGKOK, THAILAND,
World Health Organization, Bangkok (Thailand). Aedes Research Unit.
Y. H. Bang, and C. P. Pant.
Bull W H O. Vol 46, No 3, p 416-425, 1972.

Descriptors: *Aedes-aegypti, Breeding, Control, Fever, Larvicides(Abate), Mammals, *Thailand(Bangkok), Asia, Human diseases, Disease vectors.

In countries of southeast Asia, and particularly in Thailand, the practice of storing water for drinking and for household use in earthenware and cement jars in and around the house is widespread. These containers are the main breeding sites for Ae. aegypti, the vector of hemorrhagic fever in man. In the absence of a safe and effective vaccine against dengue hemorrhagic fever, vector control is the only way to prevent the spread of this disease at present. The low toxicity of Abate for mammals, combined with its long residual effectiveness against Aedes larvae at the low concentration of 1ppm and the fact that the active ingredient is released from the 1% sand granule formulation and retained by the walls of water containers, makes it feasible to use this formulation for long-term control of Ae. aegypti.--Copyright 1973, Biological Abstracts, Inc.
W74-10934

EFFECT OF WATER SALINITY ON THE INCIDENCE OF POSTHODIPLOSTOMUM INFECTION IN FISH, (IN RUSSIAN),
Ukrainian Research Inst. of the Fish Industry, Kherson (USSR).
For primary bibliographic entry see Field 5C.
W74-10938

PROBLEMS ON POLLUTION AND WATER RESOURCES IN THE NEW YORK CITY METROPOLITAN AREA,
New York City Dept. of Water Resources.
For primary bibliographic entry see Field 5D.
W74-10942

WATER QUALITY MONITORING SYSTEMS FOR ENVIRONMENTAL WATER AND INDUSTRIAL EFFLUENT IN JAPAN,
Government Industrial Research Inst., Nagoya (Japan).
H. Sunahara, Y. Ishihara, T. Ishizuka, K. Nakajima, and K. Tanaka.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 56-60, 1974. 1 fig, 1 tab.

Descriptors: *Monitoring, *Water quality standards, *Automation, Water pollution, Industrial wastes, Sampling, Mercury, Phosphorus, Cadmium, Lead, Chromium, Arsenic compounds, Public health.
Identifiers: *Japan, Cyanide.

National Water Quality Criteria of Japan were established in April 1970. The criteria concerning human health were established for cyanide, alkyl mercury, organic phosphorous, cadmium, lead, chromate, arsenide, and total mercury. Aichi prefecture installed the first automatic monitoring system for river water quality. (See also W74-10947) (Knapp-USGS)
W74-10961

NPDES SELF-MONITORING AND REPORTING REQUIREMENTS,
Environmental Protection Agency, Washington, D.C. Permit Programs Div.
N. Lailas.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 108-110, 1974.

Descriptors: *Monitoring, *Water pollution sources, *Federal water pollution control act, *Regulation, *Water quality act, Water pollution control, Legislation, Law enforcement.

On October 18, 1972, the Federal Water Pollution Control Act Amendments of 1972 were enacted. One of the major features of this sweeping revision of the Federal Water Pollution Control Laws was the establishment of a new national permit system. This key water pollution control mechanism has the title of National Pollutant Discharge Elimination System (NPDES). This Act requires that industrial, municipal and other point source dischargers obtain permits for the discharge of any pollutants into the navigable waters of the United States. The permit that will be issued under the NPDES has a basic format of effluent limits, a compliance schedule, and monitoring requirements. (See also W74-10947) (Knapp-USGS)
W74-10970

A SYSTEMS APPROACH TO PROBLEM ORIENTED RESEARCH PLANNING: A CASE STUDY OF FOOD PRODUCTION WASTES,
International Research and Technology Corp., Arlington, Va.
T. B. Taylor, D. Coillett, R. McKenna, D. Overly, and S. Perelman.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-228 114; $4.50 in paper copy, $2.25 in microfiche. Final Report, IRT-244-R, June 1973. 105 p, 32 fig, 5 tab, 7 ref.

Descriptors: *Research and development, *Planning, *Systems analysis, *Agriculture, *Wastes, *Pollution abatement, Water pollution, Air pollution, Land, Environmental sanitation.
Identifiers: *Technology assessment, Food production, Disaggregation.

Considered are two separate but interrelated topics: (1) the development and assessment of a systems approach to the identification of research needs; and (2) use of this approach in formulating a research program on problems dealing with wastes which result from U.S. food production. The method utilizes hierarchical formats for describing systems for providing goods or services and possible problems and problem solutions associated with the systems. System components, problems and possible corrective measures are progressively disaggregated and analyzed at greater levels of detail. Reported is the application of such a systems approach to the area of environmental pollution caused by release of wastes produced during the cultivation and processing of food plants, the raising of food animals, and the processing of food animal products. Problems and possible solutions requiring further research have been identified and rank ordered. The procedures developed and used in this study can provide a practicable, systematic framework for planning research programs related to areas of major national concern. (Bell-Cornell)
W74-11040

W.A.L.R.U.S. WATER AND LAND RESOURCE UTILIZATION SIMULATION PLAYER'S MANUAL (WISCONSIN VERSION),
Wisconsin Univ., Madison.
For primary bibliographic entry see Field 6A.
W74-11041

FLOATING BOOM DEPLOYMENT APPARATUS,
Pacific Pollution Control, San Francisco, Calif. (assignee)

N. D. Tanksley.
U.S. Patent No. 3,807,617, 3 p, 3 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 921, No 5, p 1923, April 30, 1974.

Descriptors: *Patents, *Pollution abatement, *Oil pollution, *Oil spills, Water quality control, Water pollution control, Equipment, Separation techniques.
Identifiers: Deployment apparatus, *Booms.

The deployment apparatus is comprised of a reel for storage, paying out and retrieval of the boom. A slide is formed for support of the partition which holds the float. The slide is formed by a pair of rails extending longitudinally in the direction of deployment of the partition and positioned in horizontally spaced relation at a distance for receipt of the float between the rails. The rails are supported on vertical posts and have interconnecting cross members which define a channel for passage of the float between the rails. (Sinha-OEIS)
W74-11046

THE EFFECTS OF NITROGEN, POTASSIUM, AND SUBIRRIGATION ON THE YIELD, QUALITY, AND COMPOSITION OF SINGLE-TRUSS TOMATOES,
Agricultural Research Council, Littlehampton (England). Glasshouse Crops Research Inst.
For primary bibliographic entry see Field 3F.
W74-11048

FLOATABLE BOOM STRUCTURE,
Sanera Projecting A. B., Nordmaling (Sweden). (assignee)
P. O. Oberg.
U.S. Patent No. 3,798,911, 6 p, 15 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 920, No 4, p 1087, March 26, 1974.

Descriptors: *Patents, *Oil spills, *Oil pollution, *Pollution abatement, *Water pollution control, *Water quality control, Equipment, Barrier.

The boom consists of buoyant tubular body sections arranged in series along the length of the boom. Each body section defining therein at least one closed compartment, mechanical expansion means within each compartment, and expansion devices. The boom becomes buoyant when released from a flat storage state. The tubular body sections when expanded are positioned so that they project upward above the surface to an extent sufficient to contain floating impurities. Air passages into each compartment prevent the entry of water into these compartments. (Sinha-OEIS)
W74-11054

OIL SLICK REMOVAL METHOD, SYSTEM AND BAG THEREFOR,
R. L. Avey.
U.S. Patent No. 3,796,656, 4 p, 17 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 920, No 2, p 474, March 12, 1974.

Descriptors: *Patents, *Oil spills, *Oil pollution, *Pollution abatement, *Water pollution control, *Water quality control, Separation techniques, Equipment.

Large plastic bags, initially rolled on a drum, or otherwise collapsed, are deployed horizontally so that the bags envelop a strip of oil slick on a body of water. When each bag is fully deployed it is released and the mouth, which is weighted, sinks to the bottom of the body of water, or if the latter is deep enough, the bag floats at the surface with the weighted mouth hanging downward in the water. The oil collects at the uppermost closed end of the bag, where it can be removed either for reuse or disposal. (Sinha-OEIS)
W74-11055

UNDERWATER LEAKAGE OIL COLLECTOR SYSTEM,
D. E. Rainey.
U.S. Patent No. 3,756,294, 3 p, 3 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 914, No 1, p 124-25, September 4, 1973.

Descriptors: *Patents, *Oil pollution, *Pollution abatement, *Water quality control, *Water pollution control, Leakage, Equipment, Conduits.
Identifiers: *Pollution prevention, Underwater leakage.

To prevent leakage from an underwater break in an oil container by entrapping the escaping oil and conveying it to a new collector, an elongated, flexible and impervious conduit is attached to the source. The conduit has an inverted channel-shaped mouth composed of cushioned sealing material and flexible magnet for mating engagement with the leakage point. The bottom portion of the mouth remains open to permit entry of water into the conduit to float the entrapped oil and accelerate its passage upward through the conduit. (Sinha-OEIS)
W74-11056

APPARATUS FOR REMOVING A SUBSTANCE FLOATING AS A LAYER ON THE SURFACE OF A BODY OF LIQUID,
Bertin and Cie, Plasier (France); and Entreprise de Recherches et d'Activites Petrolieres, Paris (France). (assignees)
J-C. J. Mourlon, and E. M. R. Dubois.
U.S. Patent No, 3,800,951, 10 p, 37 fig, 1 ref; Official Gazette of the United States Patent Office, Vol 921, No 1, p 173, April 2, 1974.

Descriptors: *Patents, *Oil spills, *Oil pollution, *Pollution abatement, *Water quality control, *Water pollution control, Flotsam, Equipment, Separation techniques.

A screw impeller generates a whirlpool in the vicinity of the substance flotsam or oil. This causes a depression of downward tapering closed bottom cup-shaped outline. The unwanted substance which accumulates may thereafter be withdrawn. The operation of the equipment is as follows: A platform is brought to the area requiring treatment and is anchored. The motor is started up to turn the screw impeller. The light substance (oil) is centripetally drawn from the depression. A suction pump is started and is adjusted to a suitable flow-rate delivering the light substance to a collection tank. (Sinha-OEIS)
W74-11057

PROCESS FOR TREATING OIL SLICKS USING CHEMICAL AGENTS,
Chevron Research Co., San Francisco, Calif. (assignee)
R. L. Ferm.
U.S. Patent No. 3,810,835, 3 p, 3 tab, 5 ref; Official Gazette of the United States Patent Office, Vol 922, No 2, p 593, May 14, 1974.

Descriptors: *Patents, *Oil spills, *Oil pollution, *Pollution abatement, Water pollution control, Water quality control.
Identifiers: *Chemical treatment, N,N-dialkyl amides, Glycols.

A chemical agent is applied to the vicinity of an oil spill in an effort to contain the spill. It is applied in such manner as to compress or gather the oil into a limited area. It is prefered to completely surround the slick with the chemical agent thereby compressing the oil spill into a limited area, preventing its spread. The chemical agent is selected from the group consisting of (1) N,N-dialkyl amides; (2) n-alkyl and n-alkylene monoethers of (a) ethylene glycol and (b) polyethylene glycol, (3) polyethylene glycol monoesters of n-alkyl acids; and (4) n-alkyl and n-alkylene monoesters of propylene glycol. (Sinha-OEIS)
W74-11059

FLOATING ANTIPOLLUTION BARRIER DEVICE.
Pneumatiques Caoutchouc Manufacture et Plastiques Kleber-Colombes (France).
L. Ballu.
U.S. Patent No. 3,811,285, 6 p, 6 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 922, No 3, p 712, May 21, 1974.

Descriptors: *Patents, *Oil spills, *Oil pollution, *Pollution abatement, Water quality control, Water pollution control, *Barriers, Separation techniques.

A floating barrier has a submerged skirt-like structure that is supported by floating devices. It comprises a longitudinal band of an air-tight pliable material folded in the longitudinal direction to provide two walls with the fold in the upward direction and an opening in the downward direction. Pockets are formed between the two walls and expanded when filled with air. The air is trapped when the barrier is placed in the water. (Sinha-OEIS)
W74-11060

APPARATUS FOR COLLECTING SURFACE PARTICLES ON BODY OF WATER,
L. Carter.
U S Patent No 3,811,325, 3 p, 4 fig, 5 ref; Official Gazette of the United State Patent Office, Vol 922, No 3, p 722, May 21, 1974.

Descriptors: *Patents, *Sampling, *Water quality, Pollutants, Ecology, *Flotsam, Equipment, *Pollution abatement.

The sampling device which is towed on the surface of the water is supported by two parallel, longitudinal floats. A rigid tubular framework with two horizontal hydrofoil bodies transverse to the floats is secured to the framework within the profile of the floats. The vertically stacked hydrofoil bodies define an intake opening, with the lower hydrofoil maintaining the intake opening at a predetermined depth below the water without causing disruptive turbulence, while the upper hydrofoil causes the sampling device to ride over swells and waves. The towing motion causes surface water to flow into the intake opening, where the flotsam is collected by a funnel-shaped net which has its wide end secured to the intake opening. The net, with the narrow end terminated by a collecting screen, lies partially submerged between the floats. (Sinha-OEIS)
W74-11061

OPERATOR CERTIFICATION PROGRAMS APPLICABLE TO INDUSTRIALLY OWNED WASTE WATER FACILITIES,
National Council of the Paper Industry for Air and Stream Improvement, Inc., New York.
For primary bibliographic entry see Field 5D.
W74-11100

HISTORICAL DEVELOPMENT OF WATER POLLUTION CONTROL COST FUNCTIONS,
National Environmental Research Center, Washington, D.C.
D. P. Tihansky.
Journal of the Water Pollution Control Federation, Vol 46, No 5, p 813-833, May 1974. 31 fig, 2 tab, 151 ref.

Descriptors: *Reviews, *Bibliographies, *History, *Cost analysis, *Cost-benefit analysis, Mathematical studies, *Mathematical models, *Water quality control, *Water pollution control, Pollution abatement, Planning, Decision making, Social needs, Social aspects, Federal government, Legislation, Federal Water Pollution Control Act, Resource allocation, Research and Development, Costs, Cost-benefit theory, Comparative costs, Waste water treatment, Waste treatment.

Because functions depict the sensitivity of treatment costs to changes in the values of determinants, they are useful in selecting the least cost strategies of water quality control. The development of cost functions received its impetus from federal support in the mid-1960's. Major publications soon appeared, largely on municipal waste control, some on industrial waste control. Continuation of such studies was encouraged by recent amendments to the Federal Water Pollution Control Act. Although treatment cost estimates are important to decision makers, they do not reveal the complete framework of economic considerations. Costs should be compared to water use benefits if strategies are designed to improve social welfare. If maximization of social welfare is the goal, both cost and benefit functions will be valuable in water quality planning models. Research on benefit functions should progress rapidly, owing to congressional and other federal interest. Opportunity costs are also to be considered in optimized allocation of resources. Some of the most comprehensive and best known cost function reports are highlighted in this review; additional pertinent studies are also listed in the appended bibliography. (Brown-IPC)
W74-11102

MAKE WATER POLLUTION CONTROL A MEANINGFUL LOCAL RESPONSIBILITY,
Muncie Sanitary District, Ind., Water Quality Div.
For primary bibliographic entry see Field 5A.
W74-11120

URBANIZATION AND THE ENVIRONMENT--ENGINEERING IMPLICATIONS,
Johannesburg City Engineer's Dept. (South Africa).
For primary bibliographic entry see Field 4C.
W74-11124

MAJOR PORT DEVELOPMENTS AT RICHARDS BAY WITH DUE REGARD TO PRESERVING THE NATURAL ENVIRONMENT,
Council for Scientific and Industrial Research, Pretoria (South Africa).
For primary bibliographic entry see Field 2L.
W74-11125

SOME CURRENT PAPER INDUSTRY ENVIRONMENTAL PROTECTION PROBLEMS,
National Council of the Paper Industry for Air and Steam Improvement, Inc., New York.
For primary bibliographic entry see Field 5D.
W74-11126

ADAPTIVE CONTROL APPLIED TO A WATER QUALITY SYSTEM,
Newark Coll. of Engineering, N.J.
H. J. Perlis.
Instrument Society of America Transactions, Vol 13, No 1, p 31-34, 1974. 1 fig, 3 tab, 13 ref.

Descriptors: *Model studies, *Control, *Water pollution, *Computers, Costs, Biochemical oxygen demand, Dissolved oxygen, Loading, Streams, Temperature, Mathematical studies, *Water quality control, Effluents.
Identifiers: Open-loop adaptive control.

A model system for a crude form of adaptive control has been applied to water pollution control problems. Its principle is response to changes in temperature, reacting with a computer. This is called open-loop adaptive control. A two-element control vector in a number of reaches of stream (not contiguous) is used. Cost/benefit tradeoffs are incorporated into the scheme. Results show a reduction in overall theoretical cost and an improvement in DO level maintenance and BOD loading. (Prague-FIRL)
W74-11129

OIL POLLUTION AND MARINE ECOLOGY,
University Coll. of Swansea (Wales). Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W74-11166

PROTECTION OF THE ENVIRONMENT DURING DEMOLITION ACTIVITIES,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Weapons Effects Lab.
F. W. Skinner, L. Miller, and W. Harvey.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-772 920, Price $3.75 printed copy; $2.25 microfiche. Miscellaneous Paper N-73-6, December 1973. 57 p, 6 fig, 2 tab, 42 ref.

Descriptors: *Construction, *Explosives, *Pollution abatement, *Water pollution control, Explosions.
Identifiers: *Environmental protection, *Demolition.

New demolition techniques were developed to minimize hazards to the environment in areas with demolition activities. Basic guidelines and optional plans of action to be considered in planning demolition projects are discussed. Current Army policies concerning protection of the environment from demolition operations are in step with broad Federal policies aimed at improving the national level of environmental quality. Preliminary guidance, aimed at protecting or improving the ambient environment, is provided for elements of the Army undertaking on-base demolition projects. (Knapp-USGS)
W74-11208

ANALYSIS OF LIGHTWEIGHT OIL CONTAINMENT SYSTEM SEA TRIALS,
Hydronautics, Inc., Laurel, Md.
E. Miller, W. Lindenmuth, and R. Altmann.
Available from NTIS, Springfield, Va 22161 as AD-770 344, Price $4.00 printed copy; $2.25 microfiche. Coast Guard Interim Technical Report No CG-D-22-74, October 1973. 128 p, 49 fig, 7 tab, 5 ref.

Descriptors: *Oil spills, *Water pollution treatment, Oily water, *Separation techniques, Sea water, Equipment, Pollution abatement.

Full scale tests of a lightweight oil containment system were carried out in March 1972 off Point Conception, California, using refined soy bean oil. The oil loss was a strong function of towing speed and sea conditions. The major mechanism of oil loss was entrainment of droplets formed at the headwave and by motions of the air bags. (Knapp-USGS)
W74-11224

OIL-WATER REGENERATIVE SEPARATOR--FINAL REPORT OF PHASE I DEVELOPMENT PROGRAM OF A CONTINUOUS REGENERATING MOVING BED TO REMOVE OIL FROM OIL-WATER SUSPENSIONS,
Hydronautics, Inc., Laurel, Md.
For primary bibliographic entry see Field 5D.
W74-11225

INFORMATION ON THE RECENT PRACTICE OF HYGIENIC QUALIFICATIONS OF SURFACE WATERS, (TAJEKOZTATO A FELSZINI VIZEK HIGIENES MINOSITESENEK JELENLEGI GYAKORLATAROL),
K. Schiefner, I. Maar, and J. Rako.
Egeszsegtvdomany, Vol 18, No 1, p 58-63, 1974. 1 fig, 2 tab, 6 ref.

Descriptors: *Water quality standards, *Trophic level, *Algae, Oxygen demand, Coliforms, Sampling, Bioindicators.
Identifiers: USSR, *Trophic character.

Based on the results of chemical, bacteriological and biological tests the extension is recommended of parameters for determining the hygienic quality of surface waters (as based on oxygen consumption, coliform counts, and saprobic character). The adoption of 'trophic character' is advised, which is evaluated by the number of algae found in a volume of water. 'Trophic character' determined on the basis of floral organisms has no direct relationship with the saprobiological feature which determines the group classification for hygienic surface water utilization. The water qualification involving new parameters generally results in a worse grouping of classifications. Evaluation of floral microorganisms (algae) draws attention to biological phenomena (mass production, flourishing of water) that influence water consumption primarily from the technological point of view, and hint at their effects (mechanical, taste and odor effects). Statistical evaluations also confirm the necessity of adopting the new parameters in water qualification. (Shaffer-FIRL)
W74-11256

DETERMINATION OF THE HEMATOCRIT VALUE OF CARP AND ITS INFLUENCING WITH COBALT, (STANOVENI HEMATODRITOVE HODNOTY KAPRU A JEJI OVLIVNENI KOBALTEM),
Vyzkumny Ustav Rybarsky and Hydrobiologicky, Vodnany (Czechoslovakia).
For primary bibliographic entry see Field 5C.
W74-11316

ICHTHYOTOXIC EFFECTS OF SOME ANTI-POLLUTION PRODUCTS,
Laboratorio Provinciale di Igiene e Profilassi, Genoa (Italy); and Genoa Univ. (Italy). Istituto di Farmacologia e Farmacognosia.
For primary bibliographic entry see Field 5C.
W74-11327

TOXICITY STUDY OF TWO OIL SPILL REAGENTS TOWARD HUDSON RIVER FISH SPECIES,
Marist Coll., Poughkeepsie, N.Y. Environmental Science Program.
For primary bibliographic entry see Field 5C.
W74-11344

EFFECT OF OIL ON MARINE ECOSYSTEMS: A REVIEW FOR ADMINISTRATORS AND POLICY MAKERS,
National Oceanographic and Atmospheric Administration, Juneau, Alaska.
D. R. Evans, and S. D. Rice.
Fishery bulletin, Vol 72, No 3, p 625-638, 1974. 79 ref.

Descriptors: *Publications, *Reviews, *Oil, *Marine biology, Bibliographies, Documentation, Oil spills, Ecosystems, Toxicity, Water pollution sources, Water pollution effects, Organic compounds, Environmental effects, Biodegradation, Sediments, Food web, Laboratory tests, On-site investigations.
Identifiers: *Crude oil, Long-term impacts, Sublethal effects.

A broad selection of recent literature on the effects of oil on marine ecosystems is reviewed. The focus is on studies on crude oil, and the results are discussed with the purposes of providing a summary of findings that will be useful as a reference for administrators and policy makers involved in decisions concerning petroleum developments and related activities. The characteristics of crude oil and factors modifying its impact on the marine environment are discussed. Most research on the toxicity of oil has dealt with acute effects and data on long-term impacts at the community level are inconclusive. It is concluded that chronic low-level pollution is potentially more damaging to ecosystems than isolated catastrophic spills. Deci-

sion makers are forced to rely on interpretive judgments rather than conclusive data. (Katz)
W74-11348

THE CONCENTRATION CONTROL OF SOLUBLE COPPER IN A MINE TAILINGS STREAM,
Montana Univ., Missoula. Dept. of Geology.
For primary bibliographic entry see Field 5B.
W74-11361

PROPELLING ARRANGEMENT FOR OIL AND GARBAGE SKIMMER CRAFT,
A. Y. Derzhavets, P. G. Kogan, V. N. Semenov, and V. I. Tabachnikov.
U.S. Patent No 3,823,828, 4 p, 2 fig, 1 reg; Official Gazette of the United States Patent Office, Vol 924, No 3, p 544, July 16, 1974.

Descriptors: *Patents, *Oil spills, *Oil pollution, *Skimming, *Pollution abatement, Water pollution control, Water quality control, Flotsam, Equipment.
Identifiers: *Skimmers.

A propelling arrangement divides the water flow entering a skimmer craft into two streams. One stream is a surface layer of water which contains floating impurities entering the collecting receptacle. The other is the underlying layer of water entering the duct for delivery to the water jet. There is thus a simultaneous drawing in of the surface layer of water together with floating impurities towards the intake of the collecting receptable. At the same time, the water flow running through the duct towards the water jet, due to the effect of the ejection passage draws water off the collecting receptacle to provide a difference in the level of water in the collection receptacle and that of the surrounding water, which is needed for the inflow to the collecting receptacle of the layer of water which contains floating impurities. (Sinha-OEIS)
W74-11404

OIL SKIMMER MODULE WITH FREE FLOATING WEIR TROUGH,
A. J. Crisafulli.
U.S. Patent No 3,822,789, 5 p, 9 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 924, No 2, p 268, July 9, 1974.

Descriptors: *Patents, *Oil pollution, *Oil spills, *Pollution abatement, Water pollution control, Water quality control, Skimming, Equipment, Separation techniques, *Weirs.
Identifiers: *Skimmers.

The skimmer incorporates a sump box having a pump for conveying material from the sump box to the floating barge or vessel. A free floating weir is disposed forward of the sump box. The connection is such that the weir may rise in relation of the sump box which maintains its position in the water. Ball joint connections between the sump box and the weir guide the limited motion between them. The sump box is oriented so that at least a portion remains below the surface of the water. A gravity inlet receives a thin layer of water and the floating pollutants. (Sinha-OEIS)
W74-11409

METHOD FOR THE CONTROL OF OILS FLOATING ON WATER,
Tenneco Oil Co., Houston, Tex. (assignee)
R. E. Gilchrist, and J. C. Cox.
U.S. Patent No 3,821,109, 4 p, 7 ref; Official Gazette of the United States Patent Office, Vol 923, No 5, p 1891, June 28, 1974.

Descriptors: *Patents, *Oil spills, *Oil pollution, *Pollution abatement, *Water pollution control, Water quality control, *Separation techniques, Catalysts.
Identifiers: Liquid alcohols, Glycerids, Ketones, Ethers, Chemical treatment.

Oil spills are controlled by dispersing on the surface, a composition of matter comprising a drying oil and a carrier for the drying oil. The drying oil contains a major proportion of a component selected from the class consisting of unsaturated fatty acids, glycerids of unsaturated fatty acids and mixture thereof. It should contain from about 50 to 90 percent by weight of a carrier selected from the class consisting of liquid alcohols, ketones and ethers; and from about 1 to 10 percent by weight of a water insoluble metallic soap catalyst. (Sinha-OEIS)
W74-11413

LEGAL CONTROLS OF POLLUTION IN THE GREAT LAKES BASIN,
Ontario Water Resources Commission, Toronto.
H. Landis.
Canadian Bar Review, Vol 48, p 66-157, 1970.

Descriptors: *Legal review, *Legislation, *Groundwater, *Surface water, *Pollution, *Law enforcement, *Canada, Great Lakes region, Harbors, Canals, Fisheries, Agriculture, Indian reservations, Water resources, Municipal water, Planning, Pesticides, Public health, Air pollution, Mining, Migratory birds.

Legal control of pollution of groundwater and surface waters in the Canadian part of the Great Lakes Basin is discussed, and the constitutional basis of such controls is considered. Provincial rather than federal primacy is recommended. Provisions of several laws are reported, including those of the Ontario Water Resources Commission Act; the Municipal, Drainage, Public Parks, and Planning acts; the Public Health and Pesticides Acts; the Conservation Authorities Act; the Energy, Gasoline Handling, and Air Pollution Control Acts; the Mining Act; the Lakes and Rivers Improvement, Public Lands, and Provincial Parks Acts; the Migratory Birds Convention Act; and the Canadian Water Act. Judicial decisions concerned with federal harbors, and canals, inland fisheries, agriculture, and Indian lands are also reviewed. (Shaffer-FIRL)
W74-11417

CONTROL OF SULFUR OXIDE POLLUTION FROM POWER PLANTS,
National Environmental Research Center, Research Triangle Park, N.C.
F. T. Princiotta.
Available from NTIS, Springfield, Va., 22161 as PB-228 706, Price $5.75 printed copy; $2.25 microfiche. March 14, 1972. 51 p, 12 fig, 6 tab.

Descriptors: *Sulfur compounds, *Air pollution, *Powerplants, Sulfates, Acids.
Identifiers: Air pollution control.

A significant contribution of SO2 control within the next five years is possible using the wet lime/limestone scrubbing process, wet magnesium oxide scrubbing, and catalytic-oxidation. At least 20 full-size desulfurization control processes for powerplants are in the design, construction or operation phase in the United States at this time. Nineteen of these use one of the three processes listed above; 16 of these are wet lime/limestone systems. The magnesium oxide (MgO) scrubbing process is similar to wet lime/limestone processes, except that the magnesium sulfite and sulfate reaction products are regenerated, producing a concentrated stream of SO2 for H2SO4 production and regenerated MgO for reuse. Wet lime/limestone processes have the lowest capital cost, followed by MgO; the catalytic oxidation process is the most expensive. The control processes discussed offer an economic incentive for use over low-sulfur fuel for many power plants, although power plant location and the fossil fuel type used strongly affect any comparison. (Knapp-USGS)
W74-11431

THE COANDA-EFFECT OIL-WATER SEPARATOR: A FEASIBILITY STUDY,
Naval Civil Engineering Lab., Port Hueneme, Calif.
For primary bibliographic entry see Field 5D.
W74-11436

6. WATER RESOURCES PLANNING

6A. Techniques Of Planning

COMPUTER SIMULATION OF WASTE WATER TREATMENT BY CHEMICAL-PHYSICAL PROCESSES,
Envirotech Corp., Palo Alto, Calif. Municipal Equipment Div.
For primary bibliographic entry see Field 5D.
W74-11037

ASSESSMENT OF SELECTED RANN ENVIRONMENTAL MODELLING EFFORTS,
Washington Univ., Seattle.
B. W. Mar, and W. T. Newell.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-227 217; $6.75 in paper copy, $2.25 in microfiche. Report No NSF/RA/E-73-004, June 1973. 64 p, 3 tab, 14 ref. NSF FI-36373.

Descriptors: *Mathematical models, *Assessments, *Environment, Data collections, Projects, Surveys, Costs, Systems analysis, *Model studies.
Identifiers: *Environmental modeling, *Interdisciplinary modeling, Experiments.

Reported are results of an experiment conducted to assess and document interdisciplinary environmental modelling activities. Groups of modellers visited each of 11 RANN projects to stimulate inter and intra project discussions of the process of modelling. Results indicate that the process is seldom recorded, and the technology of interdisciplinary modelling has not ben documented0 ffort fails to maximize use of past experiences, and three common issues are faced time and again: (1) how to define and bound the model; (2) how to direct the team to ad0ress the construction and validate the defined model; and (3) how to document and communicate the model or its results. The final step in the experiment was analysis and synthesis of the collected data. Data sets included: (1) response to survey of project modelling goals and concerns; (2) summary of project content and of on-site discussion of the project modelling process; and (3) reports generated by individual projects. The latter two items are summarized in an appendix. It is almost impossible to construct a model when some specific boundaries and structure are lacking. A major incentive for documentation of the process as well as the substance of the model is required. Needed is an accounting system which provides a measure of the real cost of model development and use. (Bell-Cornell)
W74-11038

SYSTEMS ANALYSIS OF A MULTI-STAGE TUBULAR MODULE REVERSE OSMOSIS PLANT FOR SEA WATER DESALINATION,
California Univ., Los Angeles. School of Engineering and Applied Science.
For primary bibliographic entry see Field 3A.
W74-11039

A SYSTEMS APPROACH TO PROBLEM ORIENTED RESEARCH PLANNING: A CASE STUDY OF FOOD PRODUCTION WASTES,
International Research and Technology Corp., Arlington, Va.
For primary bibliographic entry see Field 5G.
W74-11040

W.A.L.R.U.S. WATER AND LAND RESOURCE UTILIZATION SIMULATION PLAYER'S MANUAL (WISCONSIN VERSION),
Wisconsin Univ., Madison.
C. Thurow, J. Steinhart, and T. Smith.
Available from the National Technical Information Service, Springfield, Va 22161 as COM-73-11951 $2.75 in paper copy, $2.25 in microfiche. University of Wisconsin, Sea Grant Advisory Report No. 3, May 1973. 3 fig, 3 tab, 19 p.

Descriptors: *Simulation analysis, *Resources, *Water utilization, *Land use, Environment, Constraints, Decision making, Governments, Regions, Industries, Water pollution, Effluents, Agriculture, Recreation, Legislation, Cities, Tax rates, Systems analysis, Sewers.
Identifiers: *Game theory, Goal establishment, Strategies, Environmental quality.

WALRUS is a game about the processes of establishing goals and strategies for implementing them in a heterogeneous environment. The environment is represented by the physical and social realities simulated in the game: a medium-size town, Walton, situated on a bay and surrounded by two predominately rural townships. The game is played in rounds which represent approximately a year's time. Players attempt to control, and possibly optimize, their own position and the status of the region with respect to any one or more of four basic elements: economic strength, political strength, personal status and prestige, and overall environmental quality of the water resources. The lack of consensus among possible goals, or the complexity of establishing a consensus, is probably one of the more realistic aspects of this simple form of simulation modeling. Players must deal with two major physical contraints; (1) natural limitations of available land and the inevitable trade-offs in land-use decisions; and (2) water pollution. The major complexity in the game's environment involves the interaction of teams and the governmental units. The game is controlled by 'man-made laws' and by 'natural laws.' The former exist for each of three political jurisdictions. The latter include land-use characteristics, water and sewer characteristics, and influents and votes. (Bell-Cornell)
W74-11041

THE INTEGRATION OF SYSTEM IDENTIFICATION AND SYSTEM OPTIMIZATION,
California Univ., Los Angeles.
Y. Y. Haimes.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 828, $10.70 in paper copy, $2.25 in microfiche. Ph D Dissertation, 1970. 147 p, 12 fig, 44 ref, 5 append. OWRR A-033-CAL(1).

Descriptors: *Optimization, *Analytical techniques, *Model studies, *Equations, Systems analysis, Algorithms, Constraints, Digital computers, Conjunctive use, Groundwater, Surface waters.
Identifiers: Production plants, Problem-solving.

The coupling relationship between system identification and system optimization is analyzed. Four approaches for the solution of the joint problem are proposed, as applied to both static and dynamic system modeling. The Equivalence Theorem shows the equivalency between the bicriterion problem where two objective functions are minimized. The epsilon-constraint approach which views one of the objective functions as a constraint is introduced and proved. Decomposition multilevel optimization are discussed in the context of solving the integrated problem. The epsilon-constraint method is investigated in detail and shown to be feasible. Two example problems are introduced, formulated, and solved. The production plant problem, which is a nonlinear static identification and static optimization problem, is solved via decomposition and multilevel optimization techniques following the epsilon-constraint approach. A static identification and dynamic optimization problem is solved via quasilinearization. Numerical results for both problems using the IBM 360/91 digital computer are presented. Conclusions and recommendations for further study are included. (Bell-Cornell)
W74-11042

USERS GUIDE FOR A U.S. GEOLOGICAL SURVEY RAINFALL-RUNOFF MODEL,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 2A.
W74-11234

6B. Evaluation Process

RATIONAL INSTITUTIONAL ARRANGEMENTS FOR WATER RESOURCES MANAGEMENT,
Iowa Univ., Iowa City.
For primary bibliographic entry see Field 6E.
W74-10901

PURE WATERS PROJECT INCLUDES RESTORATION,
For primary bibliographic entry see Field 5D.
W74-10926

W.A.L.R.U.S. WATER AND LAND RESOURCE UTILIZATION SIMULATION PLAYER'S MANUAL (WISCONSIN VERSION),
Wisconsin Univ., Madison.
For primary bibliographic entry see Field 6A.
W74-11041

WATER-SUPPLY DEVELOPMENT AND MANAGEMENT ALTERNATIVES FOR CLINTON, EATON, AND INGHAM COUNTIES, MICHIGAN,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 4B.
W74-11223

EFFECT OF OIL ON MARINE ECOSYSTEMS: A REVIEW FOR ADMINISTRATORS AND POLICY MAKERS,
National Oceanographic and Atmospheric Administration, Juneau, Alaska.
For primary bibliographic entry see Field 5G.
W74-11348

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

HISTORICAL DEVELOPMENT OF WATER POLLUTION CONTROL COST FUNCTIONS,
National Environmental Research Center, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-11102

USE OF OZONE AND OXYGEN IN ADVANCED WASTE WATER TREATMENT,
W. R. Grace and Co., Baltimore, Md. Pollution Control Systems.
For primary bibliographic entry see Field 5D.
W74-11103

COST ANALYSIS OF GROUNDWATER SUPPLIES IN THE NORTH ATLANTIC REGION,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 4B.
W74-11426

6E. Water Law and Institutions

RATIONAL INSTITUTIONAL ARRANGEMENTS FOR WATER RESOURCES MANAGEMENT,
Iowa Univ., Iowa City.
N. W. Hines, and J. P. Smith.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 627, $5.00 in paper copy, $2.25 in microfiche. Iowa Water Resources Research Institute, Ames, Report ISWRRI-50, October 1, 1973. 142 p. OWRR A-033-IA(1).

Descriptors: *Institutions, *Local governments, *State governments, *Administration, *Management, *River Basin Commissions, *Comprehensive planning, *Interstate Commissions, *Optimal development plans, *Alternate planning, Institutional constraints, Organizations, Land management, Interstate compacts, Water districts, Land use, Administrative agencies, Governmental interrelations, Water law.

The types of state water management agencies at the state and local level and the functions of these agencies are examined. State agencies have dominated the planning and regulatory activities, whereas the local agencies, such as city and county governments and special-purpose districts, have controlled project construction and operation activities. The problems of water resource management at the local level are examined. River basin management is explored by studying the problems of existing river basin agencies which result from the lack of a comprehensive, coordinated national plan. The strengths and weaknesses of past attempts at comprehensive river basin management are evaluated. Factors influencing the operational efficiency of comprehensive management institutions on the physical dimension of the area are discussed, and the viability of an optimal hydrologic solution in light of existing social, economic and political realities is examined. Alternative state institutional arrangements discussed include the consolidation of existing state agencies into an 'environmental superdepartment,' the addition of a state coordination council to the existing arrangement, and the formation of a state department of natural resources with a division of water resource management. Emphasis is placed on the need for coordination of land-use management with water management in an institutional arrangement. Local reorganization alternatives include a freeze of existing arrangements, the dissolution of special districts and assumption of their powers by county governments, and the creation of comprehensive water districts throughout the state on a river basin basis. Interstate reorganization of River Basin Commissions and compacts is recommended to encourage state participation in interstate water management only after the state institutions are reformed to phase out local districts and create a system of state natural resource districts.
W74-10901

THE ASSESSMENT OF ENVIRONMENTAL IMPACT–WATER QUALITY AND QUALITY ASSURANCE CONSIDERATIONS,
Industrial Bio-Test Labs., Northbrook, Ill. Environmental Sciences Div.
For primary bibliographic entry see Field 5A.
W74-10952

NPDES SELF-MONITORING AND REPORTING REQUIREMENTS,
Environmental Protection Agency, Washington, D.C. Permit Programs Div.
For primary bibliographic entry see Field 5G.
W74-10970

MAKE WATER POLLUTION CONTROL A MEANINGFUL LOCAL RESPONSIBILITY,
Muncie Sanitary District, Ind., Water Quality Div.

For primary bibliographic entry see Field 5A.
W74-11120

JUDICIAL REVIEW OF ADMINISTRATIVE DECISIONS UNDER THE NATIONAL ENVIRONMENTAL POLICY ACT OF 1969,
W. C. Geer.
Land and Water Law Review, Vol 9, No 1, p 145-167, 1974. 143 ref.

Descriptors: *Legislation, *Judicial decisions, *Federal project policy, Environmental effects, Federal jurisdiction, Administrative agencies.
Identifiers: *National Environmental Policy Act (NEPA), *Environmental Impact Statements.

The National Environmental Policy Act of 1969 (NEPA) was a congressional attempt to force all federal agencies to take note of the surrounding environment and to provide for its protection. The recent flood of NEPA cases coming before the federal courts arises from the willingness of these courts to grant standing to sue to private citizens and environmental protection organizations. The Supreme Court has held that in general the question of standing depends upon whether the person has shown a 'personal stake in the outcome of the controversy'. The decisions of federal agencies made under NEPA are generally reviewable by the federal courts. Both the agency's decision as to whether the requirements of NEPA apply to the proposed project, and an analysis of the substantive environmental factors actually taken into account are reviewable by the courts. In examining an agency's determination of the applicability of NEPA and an agency's investigation of environmental effects, the courts have applied various standards at judicial review. (Ritchie-Florida)
W74-11141

THE ECONOMIC ZONE IN THE LAW OF THE SEA: SURVEY, ANALYSIS AND APPRAISAL OF CURRENT TRENDS,
Rhode Island, Univ., Kingston. Law of the Sea Inst.
D. Johnston, and E. Gold.
Occasional Paper No 17, June 1973. 53 p, 4 tab, 49 ref, append.

Descriptors: *Law of the sea, *International law, Oceans, Navigation, International waters, Treaties.

An economic zone proposal establishes an extensive maritime zone beyond the twelve mile territorial limits within which a coastal state would exercise national jurisdiction, in the form of exclusive or preferential rights with sole or special responsibility, for resources and related activities. The concept evolved from the practice of Latin-American states' extending their maritime jurisdiction 200 miles from their coasts. The concept has been embraced by developing nations in both Latin-America and Africa. The first two Law of the Sea Conferences have seen proposals for economic zones ignored. A third Law of the Sea Conference has been called, and it is predicted that this time the status quo will not be maintained. The evolution of the economic zone concept and three current proposals are discussed. The conferees are analyzed to determine the diplomatic feasibility of the economic zone proposal. It is concluded that a trend toward the acceptance of economic zones exists which will not be reversed by the Third U.N. Conference on the Law of the Sea. (Craig-Florida)
W74-11142

MOORHEAD BAYOU WATERSHED, SUNFLOWER COUNTY, MISSISSIPPI (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Jackson, Miss.
Available from National Technical Information Service as EIS-MS-73-0905-F. May 1973. 43 p, 1 tab, 2 map.

Descriptors: *Channel improvement, *Watershed management, *Watershed Protection and Flood Prevention Act, Channel erosion, Flood protection, Sedimentation.
Identifiers: *Environmental Impact Statements, *National Environmental Policy Act, *Moorhead Bayou, Miss.

This watershed project located in Sunflower County, Mississippi, involves conservation land treatment supplemented by channelization of forty miles of existing multiple purpose waterways to enhance watershed protection, flood prevention and agricultural water management. The area is dependent upon farming and related industries but the land is underproductive due to poor drainage. Erosion, sediment production and flood water damages would be significantly reduced by the project. Row crop and pasturelands will be more efficiently utilized. Approximately 230 acres of woodland will be lost along the channel banks but the economy of the area would be strengthened by providing additional employment. The turbidity of water will temporarily increase due to sediment disturbance during construction. The suggested alternatives, no action, less intensive use of the land, and conservation land treatment alone, would not be as economically desirable. The project is compatible with current and projected uses of the watershed in the county. The land required for installation of the project, labor and materials will be irretrievably committed. Comments were received by local, state and federal agencies. (Dillingham-Florida)
W74-11143

ENVIRONMENTAL DEFENSE FUND V. FROEHLKE (RESTRAINING ORDER UNDER NEPA).
348 F. Supp. 338-367 (W.D. Mo. 1972). 29 p.

Descriptors: *Judicial decisions, *Missouri, Dams, Reservoir construction.
Identifiers: *National Environmental Policy Act (NEPA), *Environmental Impact Statements.

Plaintiff Environmental Defense Fund brought action for declaratory judgment and an injunction restraining defendant Army Corps of Engineers from completing construction on a reservoir project and dam until an environmental impact statement (EIS) was completed and filed. The District Court held that since there would be no environmental impact from the mere construction but only from the actual operation of the dam, an injunction against the continuing building should not issue. The Corps stated that the EIS would be forthcoming prior to any closing of the dam. The plaintiff's contention that the National Environmental Policy Act (NEPA) requirement for an EIS mandated total and complete work stoppage was rejected. The court instead held that although the defendants were not in complete compliance with the NEPA, nevertheless an injunction should not issue automatically without consideration of all circumstances. In this case the disadvantages of a complete work stoppage in terms of contracts and economic damages were to be considered. Since the EIS was to be available prior to the closure of the dam, and since great economic harm would necessarily result, the plea for injunction was refused. The court did, however, retain jurisdiction over the issue should plaintiffs require a prompt remedy for questioning the sufficiency of the EIS, once published. (Salley-Florida)
W74-11146

CLAIMS TO THE OCEAN,
H. Rotkirch.
Environment, Vol 16, No 5, p 34-41, June, 1974. 7 fig.

Descriptors: *Law of the sea, *International law, *Oceans, *United Nations, Treaties, Continental shelf.
Identifiers: Law of the Seas Conference.

The United Nations will convene the third Law of the Sea Conference in June of 1974 in Caracas, Venezuela. The outcome of this conference will affect various users of the sea and its resources. Some of the main problems which will be raised at the upcoming conference are analyzed. The chief difficulty facing the conference is the diversity of interest groups involved. This diversity of interests is complicated by the fact that a single state may simultaneously represent several interests. One of the most important questions to be resolved is the extent a coastal nation may extend its jurisdiction. Another important question concerns a nation's right to limit freedom of passage. Closely related to this question is the preservation of the marine environment. Possible solutions to these problems are presented. (Gragg-Florida)
W74-11147

GULF OIL CORP. V. STATE MINERAL BOARD, ET AL. (ACTION ON MINERAL AND WATER BOTTOM RIGHTS).
291 So.2d 807 (La. App. 1974).

Descriptors: *Louisiana, *Judicial decisions, *Navigable waters, Gulf of Mexico, Oil.

Plaintiff seeks a declaratory judgment to quiet title to ownership of water bottoms against claims by Louisiana's State Mineral Board. The Mineral Board asserts that title to the bottoms vested in the state since 1910 when a statute forbade sale of such lands. Thus, plaintiff's claim of title is fatally defective. The court held that any sale of water bottoms was a nullity, as contrary to state law. Title had thus never been transferred from the state. The fact that plaintiffs and their ancestors-in-title had paid taxes on the land for six years did not stop the state from asserting its claim of right. Since the bottoms constituted a part of water bottom of a navigable body of water, the Gulf of Mexico, the sale of that land was a nullity and any royalties accruing to the owner of the land belong to the state. The Board of Commissioners had no authority to convey state bottom land, and the chain of title was irremediably faulty based on that defect. The court found the issues here were nearly identical to an earlier case, Winkler v. State, and that the holding of that case was dispositive. In Winkler the state's ownership of water bottoms, regardless of title in private claimants, was inalienable. A similar holding applied in this case. (Salley-Florida)
W74-11148

WATERS AND WATERCOURSES--LIABILITY FOR DIKING FLOODWATERS: REJECTION OF THE 'COMMON ENEMY' DOCTRINE.
Wash. Law Rev. Vol 44, p 516-522 1969. 30 ref.

Descriptors: *Washington, *Dikes, *Diversion structures, Flood plains, Flood plain zoning, Flood routing.
Identifiers: *Common enemy rule.

Construction of dikes to retain floodwaters within the confines of a river channel is an interference with the natural flow of the stream, and liability will result for damages caused by this interference. Washington courts had for many years followed the 'common enemy' doctrine. The doctrine states that naturally occurring precipitation and runoff is an outlaw which anyone can protect against, even though injury may result to others. Flood waters were held to be surface waters, but they could not be diverted out of a defined flood channel without incurring liability for damages. Any building of a dike, or deepening of a channel, which makes previously innocuous floods become the agent of erosion or damages property may create liability. Properties receiving benefits from flood control projects should carry the burden of property losses incurred in achieving those benefits. The technical and financial capacities of flood control projects have greatly increased and are now able to bear the economic costs they impose on others.

Possible alternatives to flood control structures, such as flood plain zoning, have negated the desirability of flood control projects if they are economically unsound. (Sperling-Florida)
W74-11149

A BILL TO PROVIDE FOR A FEDERAL ECOLOGICAL PRESERVE.
House Bill 3177, 93rd Cong, 1st Sess, 1973. 8 p.

Descriptors: *Continental shelf, *Offshore platforms, Oil wastes, Oil industry.
Identifiers: Coastal zone management.

This bill seeks to preserve a portion of the Outer Continental Shelf in the Santa Barbara Channel by providing for a moratorium on drilling operations. The moratorium would last until the ability to control and prevent pollution by oil discharges is improved and would be accomplished by labeling this area an ecological preserve. Offshore oil and gas production poses a serious threat of pollution of coastal waters. Present drilling and production methods and unsightly drilling rigs constitute an environmental and navigational hazard. The need for energy resources must be weighed against the need to develop the environment. All previous rights in leases issued pursuant to the Outer Continental Shelf Lands Act will be terminated, and the United States is vested with all rights in such leases. The holder of these leases is expressly authorized to bring an action for just compensation. A special account in the Treasury is specified to pay for these Santa Barbara leases and also what monies will go into the account. The suspension of drilling will last a maximum of five years. With the Secretary of the Interior's permission, the period can be shortened if the criteria previously outlined are satisfied. (Sperling-Florida)
W74-11150

WEBSTER V. ASKEW (ACTION TO ABATE ARMY CORPS ORDER TO CEASE LAND DEVELOPMENT).
371 F. Supp. 733 (N.D. Fla. 1973). 4 p.

Descriptors: *Florida, *Judicial decisions, Land use, Rivers and Harbors Act.

Plaintiff, a land developer, brought suit against the State of Florida and the Army Corps of Engineers. Plaintiff sought injunctive, declaratory, and monetary relief from a cease and desist order which served as notice of possible criminal sanctions for violations of the Rivers and Harbors Act. The plaintiff contended that the order was a tortious interference with his right to the use of his land. Defendants moved to dismiss the complaint on the grounds that the cease and desist order merely served as notice of an ongoing investigation and did not represent a final action by any agency. Since plaintiff had failed to exhaust his administrative remedies, the 'case and controversy' requirement for standing to sue was absent. The court sustained the motion to dismiss, holding that the court would have been required to postulate what the outcome of plaintiff's case would have been if he had followed the usual procedures of appeals and hearings at the agency level. This guesswork precluded a concrete and ripe controversy. Until all available administrative remedies were exhausted, a court hearing would be premature. (Salley-Florida)
W74-11151

BONELLI CATTLE COMPANY V. STATE OF ARIZONA (ACTION BROUGHT BY RIPARIAN OWNER TO QUIET TITLE TO LAND WHICH WAS ONCE SUBMERGED UNDER COLORADO RIVER).
94 S. Ct. 517 (1973). 14 p.

Descriptors: *Accretion(Legal aspects), *Arizona, *Submerged Lands Act, *Riparian rights, Riparian land, Colorado River.

Petitioner Bonelli brought an action to quiet title for lands exposed when a federal project on the Colorado River caused a shift in the river's course. Appellant State of Arizona contends that title remains vested in the State under either the equal footing doctrine or the Submerged Lands Act. Lower Arizona State courts found for Bonelli, but the Arizona Supreme Court held that title vested in the State. Petitioner appealed to the U.S. Supreme Court which held that under the equal footing doctrine states hold title to submerged lands to serve public purpose of maintenance of navigability, that once the waters receded that public purpose ended, and title to the land vests in the riparian owner as the newly exposed land represents an accretion. In effect, the State holds a fee on submerged lands that is defeasible on the event of a shift in the river course. Granting to the states of title to submerged lands was not intended as a windfall to the states, but rather as an implementation of the state's interest in preserving the public's access to navigable waters. Once that purpose is ended by a change in the river's course the public interest ends, and the common law concept of accretion controls. Since accretions vest in the riparian owner, petitioner's plea for quiet title must be honored. (Salley-Florida)
W74-11152

A BILL TO AMEND THE WILD AND SCENIC RIVERS ACT OF 1968.
House Bill 4326, 93rd Cong, 1st Sess, 1973. 2 p.

Descriptors: *Wild rivers, *California.
Identifiers: *Wild and Scenic Rivers Act of 1968, *American River.

This bill, provides that the Wild and Scenic Rivers Act of 1968 be amended by designating a portion of the American River in California, for potential addition to the national wild and scenic rivers system. The proposed amendment calls for Section 5, subsection (a) of the Wild and Scenic Rivers Act to include the North Fork of the American River from Cedars to Auburn Reservoir. The act also authorizes a study to be conducted by the Secretary of the Interior in accordance with provisions of the Wild and Scenic Rivers Act. The bill also designates both the completion date of the study and submission date to the President and the Congress. (Proctor-Florida)
W74-11154

DAMAGES FROM POLLUTION OF AIR AND OF SURFACE AND SUBTERRANEAN WATERS,
J. B. Anderson.
Idaho Law Review, Vol 10, No 1, p 1-26, Fall 1973. 111 ref.

Descriptors: *Penalties(Legal), Judicial decisions.
Identifiers: Injunctions.

The measure of damages resulting from pollution of air and both surface and ground waters is discussed. The analysis is based on Idaho cases. It is first necessary to determine whether the injury complained of is permanent in the legal sense or merely temporary, or recurrent. A different measure of damages applies to each. The analysis can be divided into damage to real property, personal property and to crops, trees and shrubs. The Idaho cases involve apportionment of damages between independent tort-feasors. Although there is a dearth of pollution cases in Idaho, the measure of damages is substantially the same regardless of the cause of the interference with property. (Gragg-Florida)
W74-11158

THREE TONS IS ALL YOU GET.
For primary bibliographic entry see Field 5E.
W74-11237

LEGAL CONTROLS OF POLLUTION IN THE GREAT LAKES BASIN,
Ontario Water Resources Commission, Toronto.
For primary bibliographic entry see Field 5G.
W74-11417

6F. Nonstructural Alternatives

SPECIAL FLOOD HAZARD INFORMATION REPORT, OCHLOCKONEE RIVER, FLORIDA, LAKE TALQUIN TO ALLEN LANDING.
Army Engineer District, Mobile, Ala.
November, 1971. 7 p, 1 tab, 12 plate.

Descriptors: *Reservoir operation, *Flood control, *Florida, Multiple purpose reservoirs, Flood plains.

Ownership of Jackson Bluff Dam and reservoir, Lake Talquin, on the Ochlockonee River in Leon and Gadsden Counties, Florida, has been transferred by the Florida Power Company to the State of Florida. The Division of Recreation and Parks of the Florida Department of Natural Resources assumed operation of the facility on June 1, 1971. The Department of Natural Resources requested a report on the flood probability for Ochlockonee River for the purpose of providing information and guidance for developing the flood plain. Rainfall reports from the National Weather Service and basin and river stage reports from the Geological Survey gauge at Bloxham, Florida, are used by the River Forecast Center at Atlanta, Georgia, to prepare flood predictions. The flood season is generally in the winter and spring. The flood plain is wide and very flat. Major natural floods occurred in the spring of 1948 and early fall of 1969. A dam failure in early fall in 1957 created flood conditions. The facility will be maintained for recreational purposes, and in addition programs for flood plain management have been instituted. (Barnes-Florida)
W74-11155

FLOOD PLAIN INFORMATION, HOADLEY CREEK, KETCHIKAN, ALASKA.
Corps of Engineers, Anchorage, Alaska.
For primary bibliographic entry see Field 4A.
W74-11427

FLOOD PLAIN INFORMATION, WHIPPLE CREEK, KETCHIKAN, ALASKA.
Corps of Engineers, Anchorage, Alaska.
For primary bibliographic entry see Field 4A.
W74-11428

FLOOD PLAIN INFORMATION, CARLANNA CREEK, KETCHIKAN, ALASKA.
Corps of Engineers, Anchorage, Alaska.
For primary bibliographic entry see Field 4A.
W74-11429

FLOOD PLAIN INFORMATION, KETCHIKAN CREEK, KETCHIKAN, ALASKA.
Corps of Engineers, Anchorage, Alaska.
For primary bibliographic entry see Field 4A.
W74-11430

6G. Ecologic Impact Of Water Development

EVOLUTION OF MONITORING FOR EARTHWATCH,
National Oceanic and Atmospheric Administration, Rockville, Md.
For primary bibliographic entry see Field 5A.
W74-10948

ASSESSMENT OF SELECTED RANN ENVIRONMENTAL MODELLING EFFORTS,
Washington Univ., Seattle.
For primary bibliographic entry see Field 6A.
W74-11038

URBANIZATION AND THE ENVIRONMENT--ENGINEERING IMPLICATIONS,
Johannesburg City Engineer's Dept. (South Africa).
For primary bibliographic entry see Field 4C.
W74-11124

MAJOR PORT DEVELOPMENTS AT RICHARDS BAY WITH DUE REGARD TO PRESERVING THE NATURAL ENVIRONMENT,
Council for Scientific and Industrial Research, Pretoria (South Africa).
For primary bibliographic entry see Field 2L.
W74-11125

OFFSHORE AIRPORTS EASE ENVIRONMENTAL PROBLEMS,
Parsons (Ralph M.) Co., Los Angeles, Calif.
C. J. Lord.
World Dredging and Marine Construction, Vol 10, No 5, p 32-37, May, 1974. 5 fig.

Descriptors: *Airports, *Facilities, *Construction costs, *Construction materials, Engineering, Environmental effects, United States, Land reclamation, Costs.

Due to increased awareness of the environmental situation by the public, it has grown increasingly difficult to undertake massive new airport construction on land. As a result, a number of offshore airports have been proposed or are under construction in the coastal areas of the United States. Some reasons that offshore airports minimize environmental impact are: closeness to major metropolitan centers; buffering effect of the water barrier between the disagreeable features of the development and the general public; the development is screened from view by the water barrier; there is a ready water supply for cooling and waste dispersion; and, in some cases reclaimed land is actually cheaper than existing onshore land. Related types of developments that may find it desirable to locate in an offshore setting include power plants, deep draft ports, sewage treatment plants, desalination plants, extractive industries, meat packing plants, steel mills, founderies and metal processing industries, refineries, solid waste disposal plants, and communication systems industries. The basic methods of relamation are earth fill, poldering, pile support, and floating structures. A discussion of ongoing projects and costs is included. (Shaffer-FIRL)
W74-11127

POLICY FOR LOCATION OF POWER PLANTS IN COASTAL AREAS,
North Carolina Univ., Raleigh, Sea Grant Program.
B. J. Copeland, H. C. McKenzie, Jr., A. Giambusso, and L. E. Priester.
In: Report of the Governors' Conference on Marine Resources, p 43-52, December 17-18, 1973.

Descriptors: *Heated water, *Water cooling, *Coasts, *Offshore platforms, Cooling towers, Nuclear powerplants, Electric powerplants, Electric power production.

A panel discussion on policy for location of power plants in coastal areas was held in Charleston, S.C. Testimony was presented by experts representing three interests: the environmentalists', the utility company, and the U.S. Atomic Energy Commission. Each member of the discussion recognized the need to increase production of electricity. The panel members recommended the following policies regarding location of power plants in coastal areas be implemented: identify and inventory the critical areas concerned; identify and obtain site approval for electrical power; and begin implementation of a public education program. Most power plants should not be sited in areas of critical environmental concern and must use modified intake and discharge structures to minimize entrainment. Power plants may be located offshore when the appropriate health and safety requirements are met. Differences in design and operation of power plants are necessary to insure that the specialized requirements of the marine and estuarine areas are satisfied. (Craig-Florida)
W74-11145

7. RESOURCES DATA

7A. Network Design

SYMPOSIUM ON ENVIRONMENTAL QUALITY MONITORING; SYMPOSIUM ON SOURCES AND EVOLUTION OF THE ATMOSPHERIC AEROSOL; GENERAL PAPERS.
For primary bibliographic entry see Field 5A.
W74-10947

EVOLUTION OF MONITORING FOR EARTHWATCH,
National Oceanic and Atmospheric Administration, Rockville, Md.
For primary bibliographic entry see Field 5A.
W74-10948

OPTIMIZATION OF WATER QUALITY MONITORING PROGRAMMES,
Michigan Univ., Ann Arbor. School of Public Health.
For primary bibliographic entry see Field 5A.
W74-10949

VALIDATION OF ENVIRONMENTAL DATA BY INTERCALIBRATION AND LABORATORY QUALITY CONTROL PROGRAMS,
National Bureau of Standards, Washington D.C.
For primary bibliographic entry see Field 5A.
W74-10950

NEED FOR COLLABORATIVE STUDIES OF STANDARD METHODS,
National Environmental Research Center, Cincinnati, Ohio. Water Supply Research Lab.
For primary bibliographic entry see Field 5A.
W74-10951

A NATIONAL OVERVIEW OF EXISTING COASTAL WATER QUALITY MONITORING.
Interstate Electronics Corp., Anaheim, Calif. Oceanics Div.
For primary bibliographic entry see Field 5A.
W74-11010

WATER DATA -- A NEW AWARENESS,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W74-11205

7B. Data Acquition

AN AMPEROMETRIC MEMBRANE HALOGEN ANALYZER,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 5A.
W74-10980

A SPECTROSCOPIC STUDY OF PASADENA SMOG,
National Environmental Research Center, Research Triangle Park, N.C.
For primary bibliographic entry see Field 5A.
W74-10995

PHOTOCHEMICAL REACTIONS IN A DUAL OUTDOOR SMOG CHAMBER,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 5A.
W74-10996

OPERATION CHARACTERISTICS OF NO2 PERMEATION DEVICES,
National Bureau of Standards, Washington, D.C.
For primary bibliographic entry see Field 5A.
W74-11002

A PIEZOELECTRIC SENSOR FOR MERCURY IN AIR,
National Bureau of Standards, Washington, D.C.
For primary bibliographic entry see Field 5A.
W74-11003

AN AUTOMATED INSTRUMENT FOR THE CONTINUOUS MEASUREMENT OF REACTIVE HYDROCARBONS,
Ontario Research Foundation, Sheridon Park.
For primary bibliographic entry see Field 5A.
W74-11007

INTERCOMPARISON OF SEVERAL TYPES OF CASCADE IMPACTORS,
Maryland Univ., College Park. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W74-11008

AN IMPROVED FIELD METHOD FOR DETERMINATION OF DISCONTINUOUS CAPILLARY MOISTURE (USOVERSHENSTVOVANNYY POLEVOY METOD OPREDELENIYA VLAZHNOSTI RAZRYVA KAPILLYARNOY SVYAZI),
For primary bibliographic entry see Field 2G.
W74-11014

METHOD OF INVESTIGATION OF NONLINEAR FILTRATION EFFECTS (O METODIKE ISSLEDOVANIYA NELINEYNYKH FIL'TRATSIONNYKH EFFEKTOV),
Agrofizicheskii Nauchno-Issledovatelskii Institut, Leningrad (USSR).
N. F. Bondarenko, Ye. Z. Gak, G. P. Komarov, and Yu. A. Osipov.
Pochvovedeniye, No 8, p 139-143, August 1973. 3 fig, 16 ref.

Descriptors: *Analytical techniques, *Filtration, Properties, *Rheology, *Flow, Laminar flow, Turbulent flow, Viscosity, Velocity, Pressure, Stress, Porous media, Capillary action, Curves, Equations.
Identifiers: USSR.

Correct experimental conditions for investigations of nonlinear filtration effects and rheological properties of a fluid are described. Modeling of a real porous body by cylindrical capillaries of similar or varying cross-section and disregard for processes of relaxation of a fluid structure are incorrect whenever studies are made of the character of nonlinear filtration effects and of the rheology of a moving fluid. To successfully conduct investigations, stability of filtration flow through time should be rigorously maintained, and possible development of osmotic effects and boundary-layer movement should be controlled. A rheological curve of structured fluids and velocity variation during transition from laminar to turbulent flow are diagrammed. (Josefson-USGS)

W74-11016

CTD SENSORS, SPECIFIC CONDUCTANCE AND THE DETERMINATION OF SALINITY,
North Carolina State Univ., Raleigh. Inst. of Marine Sciences.
C. E. Knowles.
Available from NTIS, Springfield, Va. 22161 as COM-73-11690, Price $3.00 printed copy; $2.25 microfiche. Sea Grant Publication 73-16 (North Carolina Center for Marine and Coastal Studies Report No 73-3), August 1973. 14 p, 5 tab, 10 ref. NOAA Grants 2-35178 and 04-3-158-40.

Descriptors: *Salinity, *Sea water, *Electrical conductance, Water temperature, On-site tests, Data collections.
Identifiers: *Specific conductance.

To convert the specific conductance measured by a conductivity-temperature-depth sensor to salinity it is necessary to establish a means of estimating the specific conductance of seawater having a salinity of 3.5%. Third order polynomial expressions were formulated for one Red Sea Water and two Normal Water samples, each having a salinity of 3.5%. (Knapp-USGS)
W74-11033

THE USE OF STANDARD BODIES TO MEASURE THE CAVITATION STRENGTH OF WATER,
Minnesota Univ., Minneapolis. St. Anthony Falls Hydraulic Lab.
For primary bibliographic entry see Field 8B.
W74-11034

WATER QUALITY PARAMETER MEASUREMENT USING SPECTRAL SIGNATURES,
Texas A and M Univ., College Station. Remote Sensing Center.
For primary bibliographic entry see Field 5A.
W74-11230

QUALITY OF BERLIN SURFACE WATERS: MEASURING SCHEME, (DAS GUTEMESS PROGRAMM DER BERLINER OBERFLACHENGEWASSER),
For primary bibliographic entry see Field 5A.
W74-11252

HOW TO MEASURE AMBIENT POLLUTION,
Philips Gloeilampenfabrieken, Eindhoven (Netherlands).
For primary bibliographic entry see Field 5A.
W74-11255

A MODIFIED ION EXCHANGE TECHNIQUE FOR THE DETERMINATION OF STABILITY CONSTANTS OF METAL-SOIL ORGANIC MATTER COMPLEXES,
California Univ., Berkeley. Dept. of Soils and Plant Nutrition.
For primary bibliographic entry see Field 5A.
W74-11262

A NEW MEIOFAUNA SAMPLER FOR QUANTITATIVE SAMPLING IN SOFT BOTTOMS, (EIN NEUER 'MEIOFAUNASTECHER' ZUR QUANTITATIVEN PROBENNAHME IN WEICHBODEN),
Kiel Univ. (West Germany). Zoologisches Institut.
R. Kolmel.
Marine Biology, Vol 25, No 2, p 163-168, 1974. 6 fig, 13 ref.

Descriptors: *Sediments, *Sampling, Technology, Bottom sampling, Assay, Benthos.
Identifiers: Meiofauna, Quantitative sampling.

A new method has been developed to obtain meiofauna samples from very soft and muddy sediments with high organic and water contents. The construction of the new instrument is described. It consists of a bottomless plexiglass box, the cover and front of which are easily removable. It does not cause compression of the sampled sediment, and hardly disturbs it. The semi-liquid surface of the sediment is kept in place by the use of a 'sledge' and a strip of tape inside the sampler. (Katz)
W74-11313

DESIGN AND EVALUATION OF A VIDICON SCANNING SPECTROMETER FOR MOLECULAR ABSORPTION AND ATOMIC EMISSION SPECTROMETRY,
Purdue Univ., Lafayette, Ind. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W74-11394

FILTER PORE-SIZE EFFECTS ON THE ANALYSIS OF AL, FE, MN, AND TI IN WATER,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 5A.
W74-11421

DETERMINATION OF TRACE METALS IN SODIUM DITHIONITE-CITRATE EXTRACTS OF SOILS AND SEDIMENTS BY ATOMIC ABSORPTION,
Geological Survey, Menlo Park, Calif. Water Resources Div.
For primary bibliographic entry see Field 5A.
W74-11425

EVALUATION OF GLACIER MASS BALANCE BY OBSERVING VARIATIONS IN TRANSIENT SNOWLINE POSITIONS,
Norwegian Water Resources and Electricity Board, Oslo.
For primary bibliographic entry see Field 2C.
W74-11437

7C. Evaluation, Processing and Publication

STORM DRAINAGE SYSTEMS DESIGN MADE ADAPTABLE FOR COMPUTERS,
Austin Co., Roselle, N.J. Civil - Structural Dept.
For primary bibliographic entry see Field 4A.
W74-10916

A SCHEME FOR ASSESSING THE RELIABILITY OF INTERPOLATED RAINFALL ESTIMATES,
Birmingham Univ. (England). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2B.
W74-10941

THE ASSESSMENT OF ENVIRONMENTAL IMPACT--WATER QUALITY AND QUALITY ASSURANCE CONSIDERATIONS,
Industrial Bio-Test Labs., Northbrook, Ill. Environmental Sciences Div.
For primary bibliographic entry see Field 5A.
W74-10952

HYDROGEOLOGY OF THE USSR. VOLUME 15: BASHKIR ASSR (GIDROGEOLOGIYA SSSR. TOM XV. BASHKIRSKAYA ASSR).
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrogeologii i Inzhenernoy Geologii, Moscow (USSR).
For primary bibliographic entry see Field 2F.
W74-11017

HYDROGEOLOGY OF THE USSR. VOLUME 29: KAMCHATKA, AND THE KURIL AND KOMANDORSKIYE ISLANDS (GIDROGEOLOGIYA SSSR. TOM XXIX. KAMCHATKA, KURIL'SKIYE I KOMANDORSKIYE OSTROVA).
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrogeologii i Inzhenernoy Geologii, Moscow (USSR).
For primary bibliographic entry see Field 2F.
W74-11018

HYDROGEOLOGY OF THE USSR. VOLUME 38: TURKMEN SSR (GIDROGEOLOGIYA SSSR. TOM XXXVIII. TURKMENSKAYA SSR).
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrogeologii i Inzhenernoy Geologii, Moscow (USSR).
For primary bibliographic entry see Field 2F.
W74-11019

HYDROGEOLOGY OF THE USSR. VOLUME 40: KIRGIZ SSR (GIDROGEOLOGIYA SSSR. TOM XL. KIRGIZSKAYA SSR).
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrogeologii i Inzhenernoy Geologii, Moscow (USSR).
For primary bibliographic entry see Field 2F.
W74-11020

NEW ANALYTICAL SOLUTIONS FOR DYE DIFFUSION EQUATIONS,
Princeton Univ., N.J. Water Resources Program.
For primary bibliographic entry see Field 2E.
W74-11021

GROUNDWATER BASIC DATA FOR ADAMS AND BOWMAN COUNTIES, NORTH DAKOTA,
Geological Survey, Bismarck, N. Dak.
For primary bibliographic entry see Field 2F.
W74-11024

WATER LEVELS IN ARTESIAN AND NONARTESIAN AQUIFERS OF FLORIDA, 1971-72,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 4A.
W74-11025

DATA BANK INVENTORY: VOL. II--CHESAPEAKE BAY, EDITION 1, 1949 THROUGH 1970,
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
For primary bibliographic entry see Field 2L.
W74-11026

HISTORICAL DEVELOPMENT OF WATER POLLUTION CONTROL COST FUNCTIONS,
National Environmental Research Center, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-11102

WATER DATA -- A NEW AWARENESS,
Geological Survey, Reston, Va.
W. W. Doyel.
Water Resources Bulletin, Vol 10, No 4, p 710-718, August 1974. 13 ref.

Descriptors: *Hydrologic data, *Data collections, *Data storage and retrieval, *Information exchange, *Data processing, Basic data collections, Computers, Data transmission, Networks, Automation, Water management(Applied).
Identifiers: *Water data.

One of the most significant changes in the field of hydrology in the past few years has been the increase in demand for basic data resulting from a new awareness on the part of planners, developers

and managers of the essential nature of such data. For many years data collection has been an onerous, routine operation, following which the data were processed and stored - either in publications or file drawers - and the job considered completed. Two developments have changed that picture: the realization that we are drastically altering the environment, and the advent of the computer. The first forced a recognition of the need for accurate basic data and the second provided a new methodology for handling and using it. The change is evidenced in many ways and numerous activities are underway at both State and Federal level for all facets of the acquisition and handling of water data. The collection of basic data still involves hard routine work and a conscientious effort to maintain a high level of quality. Hopefully, recognition of the absolutely essential nature of an adequate data base will result in the continued enhancement of the basic-data collector and the concomitant increase in support of his activities. (Knapp-USGS)
W74-11205

CATALOG OF USSR GLACIERS. VOLUME 16. ANGARA-YENISEY REGION. NO. 1. YENISEY. PARTS 3-5. NO. 2. ANGARA. PART 1. (KATALOG LEDNIKOV SSSR. TOM 16. ANGARO-YENISEYSKIY RAYON. VYPUSK 1. YENISEY. CHASTI 3-5. VYPUSK 2. ANGARA. CHAST' 1),
Akademiya Nauk SSSR, Moscow. Institut Geografii.
For primary bibliographic entry see Field 2C.
W74-11213

CATALOG OF USSR GLACIERS. VOLUME 15. ALTAY AND WEST SIBERIA. NO. 1. GORNYY ALTAY AND UPPER IRTYSH. PART 6. CHUYA RIVER BASIN (KATALOG LEDNIKOV SSSR. TOM 15. ALTAY I ZAPADNAYA SIBIR'. VYPUSK 1. GORNYY ALTAY I VERKHNIY IRTYSH. CHAST' 6. BASSEYN R. CHUI),
Tomsk State Univ. (USSR).
For primary bibliographic entry see Field 2C.
W74-11214

CATALOG OF USSR GLACIERS. VOLUME 14. SOVIET CENTRAL ASIA. NO. 3. AMU-DAR'YA. PART 6. SURKHOB RIVER BASIN BETWEEN MOUTHS OF THE OBIKHINGOU AND MUKSU RIVERS (KATALOG LEDNIKOV SSSR. TOM 14. SREDNYAYA AZIYA. VYPUSK 3. AMU-DAR'YA. CHAST' 6. BASSEYN R. SURKHOB MEZHDU UST'YAMI REK OBIKHINGOU I MUKSU),
Akademiya Nauk SSSR, Moscow. Institut Geografii.
For primary bibliographic entry see Field 2C.
W74-11215

CATALOG OF USSR GLACIERS. VOLUME 8. NORTHERN CAUCASUS. PART 6. CHEGEM RIVER BASIN. PART 7. CHEREK RIVER BASIN(KATALOG LEDNIKOV SSSR. TOM 8. SEVERNYY KAVKAZ. CHAST' 6. BASSEYN R. CHEGEMA. CHAST' 7. BASSEYN R. CHEREKA),
Akademiya Nauk SSSR, Moscow. Institut Geografii.
For primary bibliographic entry see Field 2C.
W74-11216

CATALOG OF USSR GLACIERS. VOLUME 14. SOVIET CENTRAL ASIA. NO 1. SYRDAR'YA. PART 4. (KATALOG LEDNIKOV SSSR. TOM 14. SREDNYAYA AZIYA. VYPUSK 1. SYRDAR'YA. CHAST' 4.),
For primary bibliographic entry see Field 2C.
W74-11217

CATALOG OF USSR GLACIERS. VOLUME 17. LENA-INDIGIRKA REGION. NO. 2. MIDDLE LENA. PART 1; NO. 5. LOWER LENA. PART 2. (KATALOG LEDNIKOV SSSR. TOM 17. LENSKO-INDIGIRSKIY RAYON. VYPUSK 2. SREDNYAYA LENA. CHAST' 1; VYPUSK 5. NIZHNYAYA LENA. CHAST' 2.),
Akademiya Nauk SSSR, Moscow. Institut Geografii.
For primary bibliographic entry see Field 2C.
W74-11218

CATALOG OF USSR GLACIERS. VOLUME 14. SOVIET CENTRAL ASIA. NO. 2. KIRGIZIA. PART 3. BASIN IN UPPER REACHES OF THE CHU RIVER (KATALOG LEDNIKOV SSSR. TOM 14. SREDNYAYA AZIYA. VYPUSK 2. KIRGIZIYA. CHAST' 3. BASSEYN VERKHOV'YEV R. CHU),
For primary bibliographic entry see Field 2C.
W74-11219

CATALOG OF USSR GLACIERS. VOLUME 14. SOVIET CENTRAL ASIA. NO. 1. SYRDAR'YA. PART 6. ATBASHI RIVER BASIN (KATALOG LEDNIKOV SSSR. TOM 14. SREDNYAYA AZIYA. VYPUSK 1. SYRDAR'YA. CHAST' 6. BASSEYN R. ATBASHI),
For primary bibliographic entry see Field 2C.
W74-11220

CATALOG OF USSR GLACIERS. VOLUME 14. SOVIET CENTRAL ASIA. NO. 2. KIRGIZIA. PART 2. BASINS OF LEFT-BANK TRIBUTARIES OF THE CHU RIVER DOWNSTREAM FROM MOUTH OF THE KOMORCHEK RIVER (KATALOG LEDNIKOV SSSR. TOM 14. SREDNYAVA AZIYA. VYPUSK 2. KIRGIZIYA. CHAST' 2. BASSEYNY LEVYKH PRITOKOV R. CHU NIZNE USTYA R. KOMORCHEK),
Leningrad State Pedagogical Inst. (USSR).
For primary bibliographic entry see Field 2C.
W74-11221

NORTH CASCADES HIGHWAY SR-20 AVALANCHE ATLAS,
Washington Univ., Seattle. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2C.
W74-11226

HYDROLOGIC ENGINEERING METHODS FOR WATER RESOURCES DEVELOPMENT: VOLUME I, REQUIREMENTS AND GENERAL PROCEDURES,
Hydrologic Engineering Center, Davis, Calif.
For primary bibliographic entry see Field 8B.
W74-11231

HYDROLOGIC ENGINEERING METHODS FOR WATER RESOURCES DEVELOPMENT: VOLUME 10. PRINCIPLES OF GROUNDWATER HYDROLOGY,
Hydrologic Engineering Center, Davis, Calif.
For primary bibliographic entry see Field 8B.
W74-11232

USERS GUIDE FOR A U.S. GEOLOGICAL SURVEY RAINFALL-RUNOFF MODEL,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 2A.
W74-11234

AUTOCORRELATION STRUCTURE OF MONTHLY STREAMFLOWS,
Geological Survey, Reston, Va. Water Resources Div.
For primary bibliographic entry see Field 2E.
W74-11419

RIVER MILE INDEX, SEVIER LAKE BASIN, UTAH AND MINOR BASINS IN WESTERN UTAH AND EASTERN NEVADA.
Forest Service (USDA), Ogden, Utah. Intermountain Region.
Pacific Southwest Interagency Committee River Mile Index Report, June 1974. 41 p.

Descriptors: *Rivers, *Southwest US, Surveys, Maps, *Utah, *Nevada, River basins.
Identifiers: *River mile index, *Sevier Lake Basin(UT).

This river mile index for the Sevier Lake basin and minor streams in western Utah and eastern Nevada is one of a series of reports for stream basins in the Pacific Southwest. River mileages were determined from independent measurements made on U.S. Forest Service planimetric maps or U.S. Geological Survey topographical quadrangles. River mile distances were measured upstream from the mouth to the nearest tenth mile. Tributaries are shown as entering from the right or left from a position facing downstream. Streams and points of interest are based on the volume of flow, size of drainage, and degree of development. (Knapp-USGS)
W74-11432

DIGITAL MODELING OF RADIOACTIVE AND CHEMICAL WASTE TRANSPORT IN THE SNAKE RIVER PLAIN AQUIFER AT THE NATIONAL REACTOR TESTING STATION, IDAHO,
Geological Survey, Idaho Falls, Idaho.
For primary bibliographic entry see Field 5B.
W74-11439

HYDROLOGIC DATA FOR MOUNTAIN CREEK, TRINITY RIVER BASIN, TEXAS, 1972,
Geological Survey, Austin, Tex.
H. D. Buckner.
Open-file report, May 1974. 13 p, 1 fig.

Descriptors: *Basic data collections, *Rainfall-runoff relationships, *Small watersheds, *Texas, *Water yield, Data collections, Hydrologic data, Hydrographs, Discharge(Water).
Identifiers: Mountain Creek(TX), *Trinity River basin(TX).

Records of streamflow and reservoir content of Mountain Creek, Texas for the year are given in a form which facilitates their use in detailed analyses of the hydrologic system. This report covers the 1972 water year. The stream-gaging stations on Mountain Creek near Cedar Hill and Walnut Creek near Mansfield provide hydrologic data to define runoff characteristics from small drainage basins. They also serve as index stations for inflow into the reservoir and provide operational data for the reservoir. In addition, the station Walnut Creek near Mansfield is equipped with a recording rain gage. The stage station near Duncanville provides data pertinent to operation of the gates in the Mountain Creek Lake Dam. The reservoir-content station at the dam provides records of reservoir stage and contents. The stream-gaging station Mountain Creek at Grand Prairie provides records of outflow from Mountain Creek Lake and the basin. (Knapp-USGS
W74-11441

HYDROLOGIC DATA FOR PIN OAK CREEK, TRINITY RIVER BASIN TEXAS, 1972,
Geological Survey, Austin, Tex.
B. B. Hampton.
Open-file report, May 1974. 26 p, 2 fig, 3 tab.

Descriptors: *Basic data collections, *Rainfall-runoff relationships, *Small watersheds, *Texas, Data collections, Hydrologic data, Hydrographs, Sediment load, Discharge(Water), Water resources development.
Identifiers: Pin Oak Creek(TX), *Trinity River basin(TX).

This report, which is the thirteenth in a series of basic-data reports published annually for the Pin Oak Creek study area in Texas, contains the rainfall and runoff data collected during the 1972 water year for the 17.6-square-mile area above the stream-gaging station Pin Oak Creek near Hubbard, Texas. The locations of floodwater-retarding structures (ungaged) and hydrologic-instrument installations in the Pin Oak Creek study area are shown. The records collected before watershed development (1956-65) and after complete watershed development (1965-72) are to be used in the analyses of rainfall-runoff relationships. Four recording and two nonrecording rain gages are located in the study area to determine the amount and intensity of rainfall. The rain gages were located to give the best geometric coverage of the study area. Basin rainfall is computed as the arithmetic average of the six gages. Daily rainfall observed at the nonrecording gages is distributed to storm periods on the recorded rainfall. The stream-gaging station, Pin Oak Creek near Hubbard, continuously records the stage, which together with measurements of streamflow are used to compute runoff from the study area. (Knapp-USGS)
W74-11442

8. ENGINEERING WORKS

8A. Structures

SCALE-UP SOLID BOWL CENTRIFUGE PERFORMANCE,
Duke Univ., Durham, N.C. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W74-10914

RECOMMENDATIONS FOR INSTALLING PVC GRAVITY SEWER PIPING,
Plastics Pipe Inst., New York.
R. Durazo.
Public Works, Vol 105, No 4, p 80-81, April, 1974. 2 fig.

Descriptors: Pipes, Engineering structures, *Sewers, *Plastic pipes, *Pipe foundations.
Identifiers: PVC pipes.

Procedures are described for installing PVC sewer pipe to get the best results. The pipe should be bedded true to line and grade with uniform and continuous support from a firm base. Blocking should not be used to bring the pipe to grade. Lateral restraint should be provided by properly placed and compacted backfill material. Appropriate material should be used for bedding, haunching, and initial backfilling. In addition, care should be taken during excavation to provide as narrow a trench as practical at a point level with the top of the pipe. Well points or underdrains may be required when excavating below ground water level. USCS Soil Classification System (FHA Bulletin No. 373) is described, and haunching and initial backfill procedures during various conditions and for the various soil classifications are described. (Murphy-FIRL)
W74-10919

EPOXY TAR LINES BIRMINGHAM'S TRUNK,
D. Hayward.
New Civil Engineer, p 40-41, January 31, 1974. 3 fig.

Descriptors: *Sewers, *Tunnels, *Linings, Engineering structures, Concrete pipes, *Epoxy resins, Protective coatings.
Identifiers: Epoxy tar, Glass fiber, *United Kingdom(Birmingham).

To deal with the problem of chemical attack and corrosion, Birmingham, England, is trying a new method of coating the inside of its sewer tunnel's smooth precast concrete lining with epoxy tar. The coating was developed by Spun Concrete and consists of fiber glass tissue sandwiched between two layers of epoxy tar. The fiber glass is for strength and abrasion resistance. A trowel is used to apply the coating. The 35 percent increase in cost will be offset by reduced maintenance and replacement. The tunnel is 1.5 meters in diameter and runs through rock riddled with coal seams, ironstone and fireclay. The coal seams had been worked and were open or filled with debris, presenting the danger of local subsidence. To accommodate this probable eventuality flexible pipes and linings were used (Flexilok - Extraflex segments made by Spun Concrete). The epoxy coating survived the construction process well. (Murphy-FIRL)
W74-10920

SEWER-WITHIN-SEWER SAVES CITY $400,000,
For primary bibliographic entry see Field 5D.
W74-10921

USE OF PIPELINES AS AEROBIC BIOLOGICAL REACTORS,
General Electric Co., Philadelphia, Pa.
For primary bibliographic entry see Field 5D.
W74-10925

THE PRESSURE SEWER: A NEW ALTERNATIVE TO THE GRAVITY SEWER,
New York State Dept. of Environmental Conservation, Albany.
For primary bibliographic entry see Field 5D.
W74-10946

HYDRAULIC PERFORMANCE OF PENNSYLVANIA HIGHWAY DRAINAGE INLETS INSTALLED IN PAVED CHANNELS,
Lehigh Univ., Bethlehem, Pa. Dept. of Civil Engineering.
P. P. Yee, W. H. Graf, and A. W. Brune.
Available from NTIS, Springfield, Va 22161 as PB-222 488, Price $6.25 printed copy; $2.25 microfiche. Office of Research, Fritz Engineering Laboratory Interim Report 364-3, November 1972. 74 p, 23 fig, 8 tab, 11 ref, 2 append. Penn DOT 68-31.

Descriptors: *Intakes, *Drainage systems, *Road design, *Pennsylvania, Hydraulics, Hydraulic models, Design, Highways, Open channel flow, Runoff, Storm runoff.
Identifiers: *Drainage inlets.

The capacities of three different standard inlets gratings installed in paved channels by the Pennsylvania Department of Transportation were determined in a paved drainage channel equipped with adjustable slopes. The longitudinal slope ranged from 0.5% to 8%; one side slope ranged from 48:1 to 12:1; and the other slope was at an inclination of either 3:1 or 1/8:1. The drainage inlets studied were Type J Inlet, Type 4-Ft. Special Inlet, and Type 6-Ft. Special Inlet. Model inlets were built to half the scale of the actual inlets. Each inlet was tested under a variety of channel configurations and of channel flow rates. The capacity of an inlet was determined by actual measurements, and the efficiency of each inlet was obtained. A series of curves, relating efficiency to capacity for an inlet, are presented. The curves show that as more water flows in the channel toward an inlet the efficiency of the inlet decreased. (Knapp-USGS)
W74-11009

APPLICATION HYDROLOGIC AND HYDRAULIC RESEARCH TO CULVERT SELECTION IN MONTANA--VOL II, APPENDICES,
Montana State Univ., Bozeman. Dept. of Civil Engineering and Engineering Mechanics.
For primary bibliographic entry see Field 8B.
W74-11022

ENGINEERING ASPECTS OF WASTE WATER TREATMENT IN AERATED RING-SHAPED CHANNELS,
Technion - Israel Inst. of Tech., Haifa.
For primary bibliographic entry see Field 5D.
W74-11065

SMOKE TESTING PINPOINTS SURFACE WATER INFLOW,
Superior Signal Co., Spotswood, N.J.
F. M. Nichols.
Deeds and Data (Water Pollution Control Federation), p D2, D6, June 1974.

Descriptors: *Treatment facilities, *Pipelines, *Engineering structures, *Surface waters, *Conduits, *Smoke, *Sewerage, *Hydraulic structures, *Aquifer testing, *Testing procedures, *Leakage, *Seepage control, *Infiltration, Rainfall, Operation and maintenance, Runoff, Subsurface runoff.
Identifiers: Smoke tests(For pipe openings), Defects.

Openings that allow surface water inflow are the principal cause of the overloading of waste water treatment plants and collection systems during a rainfall. Blowing a large volume of air mixed with smoke into the system is an economic and rapid way for locating such openings in sewage mains, laterals, and even house plumbing simultaneously, regardless of pipe diameter. The cost of smoke testing is only a few cents per foot, including labor, equipment, and materials. Operating techniques of this method are outlined, and two illustrative case histories are cited. Smoke tests may reveal infiltration sources that are easily missed by other procedures, including camera surveys. They are also effective for acceptance inspection of new lines, if done within 72hr of backfilling before soil compaction. One or two sections of a main may be tested within 5-10min, much faster than other line-testing methods. (Brown-IPC)
W74-11082

STEEL PIPELINE DESIGN,
Crest Engineering Co., Tulsa, Okla.
R. C. Hughes, W. R. DeKeyser, L. L. Elder, and G. R. Wilson.
Civil Engineering-American Society of Civil Engineers, Vol 44, No 3, p 64-67, March, 1974. 1 fig.

Descriptors: *Pipelines, *Design criteria, Standards, *Slurries, Temperature, Fluid temperature, *Corrosion control, Pressure, Structures, Engineering structures, Communication, Research.
Identifiers: *Steel pipelines, *Liquid petroleum, Water pipelines, Stress.

Design criteria differ for steel pipelines used for slurry, liquid petroleum, gas, and water. Experts in each area discuss differences between them. Slurry pipeline design refers to long distance transportation of a designed slurry; both liquid and solid stresses are discussed. Corrosion/erosion resistant linings are essential for reducing required wall thickness. For liquid petroleum pipelines, criteria for internal and external pressures defined in various codes and standards are the minimum requirements rather than the limits for the engineer. Factors to be considered in design are temperature, fluid temperature, dynamic effects, longitudinal stress, corrosion, threading and grooving, and wall thickness and defect tolerances. Gas pipelines follow similar criteria, with additional limitations due to possible internal corrosion. The discussion of water pipelines includes those buried for water supply and transmission pipelines with pipe in diameters 24 inches and larger. Internal pressures, external loads and protective linings and coatings, cathodic protection, and types of field joints are described. Standardized symbols in coding as well as communication between en-

gineers in these subfields were deemed necessary. (Prague-FIRL)
W74-11119

OFFSHORE AIRPORTS EASE ENVIRONMENTAL PROBLEMS,
Parsons (Ralph M.) Co., Los Angeles, Calif.
For primary bibliographic entry see Field 6G.
W74-11127

ENERGY DISSIPATOR FOR SANTA PAULA CREEK, SANTA CLARA RIVER, CALIFORNIA, HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
For primary bibliographic entry see Field 8B.
W74-11210

LOCK AND DAM NO. 8, ARKANSAS RIVER NAVIGATION PROJECT, HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
For primary bibliographic entry see Field 8B.
W74-11211

AN EMPIRICAL STUDY OF LIGHT PATH BEHAVIOR, AND APPLICATION OF THE FINDINGS TO THE DESIGN OF PRECISE SURVEYING SYSTEMS FOR DAM ALIGNMENT.
Towill, Inc., San Francisco, Calif.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-773 654, Price $3.75 printed copy; $2.25 microfiche. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi, Miscellaneous Paper 0-73-12, December 1973. 55 p, 17 fig, append. Army Contract DACW03-71-C-0068.

Descriptors: *Surveys, *Surveying instruments, *Measurement, Light, Optical properties, Physics, Bench marks, *Instrumentation, Refractivity.
Identifiers: *Lasers.

The forces and influences that act upon a precise surveying system were studied to attempt to identify the cause of detrimental influences and to investigate the feasibility of minimizing these influences in practical applications. The effects of temperature, pressure, humidity, wind, and fog on light paths were determined. The effects of elevation on survey lines, length of line, and laser output were also studied. In dam galleries, horizontal monuments in the form of stainless steel plates should be grouted permanently into the gallery walls, to serve as precise survey positions, and as supports for instrument brackets, lateral adjustors, and surveying instruments. Prior to and during surveys, care should be taken to minimize the flow of air through the gallery from differentially heated sources. To minimize the effect of differential heating of the concrete, survey lines should be at least 12 in. from the gallery walls. In new dams, survey lines should be established midway between gallery walls so that the effect of hydration heat will be equalized. During the survey, personnel should stand at least 16 in. from the survey line so that body heat does not create air temperature anomalies that may distort the survey line. Survey lines should be located in regions of minimum air mixing. (Knapp-USGS)
W74-11212

8B. Hydraulics

METHOD OF TREATING SUBTERRANEAN FORMATION TO IMPROVE PERMEABILITY,
Texaco, Inc., New York.
A. B. Thigpen, Jr., and J. F. Tate.
U.S. Patent 3,807,500. Issued April 30, 1974. Official Gazette of the U.S. Patent Office, Vol 921, No 5, p 1893-1894, April 30, 1974. 1 fig.

Descriptors: *Patents, *Aquifer management, *Permeability, *Subsurface drainage, *Artificial recharge, Infiltration, Clays.

A method is described for treating subterranean formations containing water sensitive clays which have sustained permeability damage due to contact with fresh water. To increase the permeability of the subterranean formations a solution of potassium chloride is injected into the formation via wells drilled into the formations. Treatment with a heated fluid including steam having a temperature of at least 300F for several hours follows. The formation is then further treated with mud acid or retarded mud acid. (Murphy-FIRL)
W74-10931

NIAGARA FALLS WATER PLANT CONVERTS GRAVITY FILTERS HYDRAULICALLY.
For primary bibliographic entry see Field 5D.
W74-10943

HYDRAULIC PERFORMANCE OF PENNSYLVANIA HIGHWAY DRAINAGE INLETS INSTALLED IN PAVED CHANNELS,
Lehigh Univ., Bethlehem, Pa. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8A.
W74-11009

METHOD OF INVESTIGATION OF NONLINEAR FILTRATION EFFECTS (O METODIKE ISSLEDOVANIYA NELINEYNYKH FIL'TRATSIONNYKH EFFEKTOV),
Agrofizicheskii Nauchno-Issledovatelskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 7B.
W74-11016

APPLICATION HYDROLOGIC AND HYDRAULIC RESEARCH TO CULVERT SELECTION IN MONTANA--VOL II, APPENDICES,
Montana State Univ., Bozeman. Dept. of Civil Engineering and Engineering Mechanics.
E. R. Dodge.
Available from NTIS, Springfield, Va. 22161 as PB-220 094, Price $3.00 printed copy; $2.25 microfiche. Final Report to Montana Department of Highways Planning and Research Bureau, September 15, 1972. 141 p, 5 append.

Descriptors: *Design flow, *Culverts, *Montana, Regression analysis, Frequency analysis, Flood frequency, Peak discharge, Flood forecasting, Streamflow forecasting, Hydraulics.

A regional frequency analysis was performed, involving both natural and synthetic streamflow records, to estimate flood magnitude of various recurrence intervals for each of 230 Montana Watersheds. Using regression analysis, flood peak prediction equations for the 2, 5, 10, 25 and 50 year recurrence intervals were developed for each of 9 contiguous geographic regions in Montana. These equations predict the flood peak as the product of powers of various hydrologic watershed parameters. (Knapp-USGS)
W74-11022

LONG WAVE EXCITATION IN HARBOURS--AN ANALYTICAL STUDY,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
U. Unluata, and C. C. Mei.
Available from NTIS, Springfield, Va. 22161 as AD-770 842, Price $6.50 printed copy; $2.25 microfiche. Ralph M. Parsons Laboratory for Water Resources and Hydrodynamics, Technical Report No 171, October 1973. 284p, 48 fig, 24 ref, 5 append. Navy Contract N00014-67-A-024-0036.

Descriptors: *Waves(Water), *Surges, *Seiches, *Harbors, Hydraulics, Wind tides, Mathematical studies, Winds, Resonance.

Harbor oscillations were studied analytically. Ignoring real fluid effects, the method of matched asymptotics was utilized by assuming that the large bodies of water in a harbor system communicate with each other through junctions of much smaller dimensions. In the neighborhood of a junction, the flow is approximated by a potential flow whereas in the greater part of the fluid, the junction can be represented by a source or a sink. The finite length of a short junction can be incorporated with the width to define an effective width, thereby enabling previous results for a gap in a thin breakwater to be extended. For a long and narrow bay the position of a partitioning breakwater with a gap is important for general modes. Improper positioning may adversely affect the inner bay. For a harbor with two coupled basins of equal size, the proliferation of resonant peaks is important. The effect of a river at the back of a harbor basin was also studied. Due to additional energy radiation, the response is in general less severe than the riverless harbor. (Knapp-USGS)
W74-11031

THE USE OF STANDARD BODIES TO MEASURE THE CAVITATION STRENGTH OF WATER,
Minnesota Univ., Minneapolis. St. Anthony Falls Hydraulic Lab.
E. Silberman, F. R. Schiebe, and E. Mrosla.
Project Report No 141, September 1973. 49 p, 12 fig, 2 tab, 29 ref, 3 append. ONR Contract N00014-67-A-0113-0032.

Descriptors: *Cavitation, *Hydraulic models, Fluid mechanics, Bubbles, Laboratory tests.

A technique for measuring the cavitation strength of water is based on counting cavitation events as a function of cavitation number on a standard body, thereby producing cavitation characteristic curves. It is assumed that water cavitates because of nuclei carried in the water and that the measured characteristic curves must therefore be related to the nuclei which are present. It was hypothesized that the nuclei could be represented by a distribution of equivalent gas bubbles of neutral density. By calculating cavitation characteristic curves for various bubble numbers and size distributions and comparing the calculated curves with measured curves for the same body, it was possible to infer the specifications for the equivalent bubble nuclei that were present in any test. Incipient cavitation should be predictable. (Knapp-USGS)
W74-11034

THE RANDOM MODEL IN FLUVIAL GEOMORPHOLOGY,
Thomas J. Watson Research Center, Yorktown Heights, N.Y.
J. S. Smart.
Available from NTIS, Springfield, Va. 22161 as AD-768 040, Price $3.00 printed copy; $2.25 microfiche. Technical Report No 10, August 1973. 40 p, 7 fig, 1 tab, 33 ref. ONR Contract No N00014-70-C-0188.

Descriptors: *Geomorphology, *Statistical models, Hortons law, Stochastic processes, *Drainage patterns(Geologic), Erosion, Weathering, *Drainage density.

A statistical model of drainage basin composition is primarily based on two postulates suggested by investigations of the role of randomness in drainage network development. The postulates are: (1) the topology of channel networks is random; (2) link lengths are independent random variables drawn from a common distribution. Examples of the application of the random model in description, estimation, and explanation of drainage basin properties are given. (Knapp-USGS)
W74-11035

OFFSET BREAKWATER CONFIGURATION,
W. L. Moore.
U.S. Patent No 3,800,543, 4 p, 19 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 921, No 1, p 68, April 2, 1974.

Descriptors: *Patents, *Shore protection, *Breakwaters, Equipment, Beaches, Shores, Barriers.

A breakwater provides wave reflecting surfaces designed so that when part of the wave is reflected at one surface, another part is reflected at a surface which is displaced by approximately one-half the wavelength of the incident wave. The displacement of the reflecting surfaces serves to balance and cancel out wave forces on the structure itself and can be adjusted to correspond to the desired or expected range of incident wavelengths. (Sinha-OEIS)
W74-11058

ROUGHNESS COEFFICIENTS OF VEGETATED FLOOD PLAINS,
Ministry of Transport and Waterways, the Hague (Netherlands). Maas-River Study Div.
For primary bibliographic entry see Field 2E.
W74-11136

VARIED FLOW FUNCTIONS FOR ELLIPTIC CHANNELS,
Iowa Univ., Iowa City. Inst. of Hydraulic Research.
O. Gueven.
Journal of Hydraulic Research. Vol 12, No 1, p 1-23, 1974. 5 fig, 8 tab, 6 ref, 1 append.

Descriptors: *Gradually varied flow, *Flow profiles, *Open channel flow, *Non-uniform flow, Flow, Channels, Hydraulics, Uniform flow, Equations, Dimensional analysis, Critical flow, Curves, Depth-area curves, Numerical analysis.
Identifiers: *Elliptic channels, Prismatic channels, Varied flow functions, Flow depth, *Nondimensional analysis, Channel geometry.

The equation of gradually varied flow is written in a suitable nondimensional form and two varied flow functions are defined. Numerical values for these functions are tabulated for elliptic channels with several different ratios of the semimajor axis to the semiminor axis. Dimensional and nondimensional flow profiles can be obtained with the aid of the two varied flow functions. Nondimensional curves are presented to aid in the calculation of uniform flow in elliptic channels. (Humphreys-ISWS)
W74-11139

CONCRETE ARMOR UNITS FOR PROTECTION AGAINST WAVE ATTACK, REPORT OF AD HOC COMMITTEE ON ARTIFICIAL ARMOR UNITS FOR COASTAL STRUCTURES.
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
For primary bibliographic entry see Field 8F.
W74-11209

ENERGY DISSIPATOR FOR SANTA PAULA CREEK, SANTA CLARA RIVER, CALIFORNIA, HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
J. H. Ables, Jr.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-762 540, Price $3.00 printed copy; $2.25 microfiche. Technical Report H-73-11, June 1973. 52 p, 4 fig, 20 plate, 17 photo.

Descriptors: *Energy dissipation, *Hydraulic models, *Drops(Structures), Hydraulic structures, Hydraulic jump, Hydraulics, Spillways, Open channel flow, *California.
Identifiers: *Santa Clara River(CA).

The Santa Paula energy dissipator at the confluence of Santa Paula Creek and Santa Clara River, California, reduces velocities and dissipates energy from floodflows. Since floodflows could occur in the Santa Paula Channel with little or no tailwater effect from flow in the Santa Clara River, an energy dissipator that will function satisfactorily regardless of tailwater elevation is desirable. Thus, a design with impact blocks placed throughout the structure to gradually reduce velocities and induce backwater in the channel was used. A model investigation was conducted on a 1:20-scale model reproducing a 570-ft-long by 60-ft-wide high-velocity approach channel, a 750-ft-long energy dissipator, and a 500-ft-wide schematic portion of the Santa Clara River. Tests were concerned with flow conditions in the superelevated approach immediately upstream from the energy dissipator, the optimum size and configuration of the dissipator, and stability of the riprap plan at the confluence of Santa Paula Creek and Santa Clara River. Tests revealed that flow conditions in the high-velocity channel and curve immediately upstream of the energy dissipator were satisfactory, while conditions in the original design energy dissipator were unsatisfactory. An energy dissipator was developed and resulted in satisfactory flow conditions with design discharge conditions (27,000 cfs) as well as a full range of flows. (Knapp-USGS)
W74-11210

LOCK AND DAM NO. 8, ARKANSAS RIVER NAVIGATION PROJECT, HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
J. J. Franco, and C. D. McKellar, Jr.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-763 174, Price $3.00 printed copy; $2.25 microfiche. Technical Report H-73-10, May 1973. 91 p, 4 fig, 42 plate, 2 tab.

Descriptors: *Hydraulic models, *Arkansas, *Dams, *Canals, *Locks, Dredging, Sedimentation, Navigation, Channel improvement, River training.
Identifiers: *Arkansas River.

A movable-bed model reproducing 11.0 miles of the Arkansas River, with a horizontal scale of 1:120 and a vertical scale of 1:80, was used to determine the suitability of a proposed site for a lock and dam structure, adequacy of proposed regulating works in the reach upstream and downstream of the structures and modifications required to provide adequate channel dimensions and satisfactory navigation conditions, and relative effectiveness of various sizes of dredged channels. Development of an adequate channel in the reach was affected by the natural tendency for the channel to cross toward the right bank upstream of the proposed damsite and by the tendency for the channel to meander in the long flat bend downstream of the dam. Because of these tendencies, considerable modification of the proposed training structures to provide a reasonably stable channel of adequate dimensions would be required. (Knapp-USGS)
W74-11211

HYDROLOGIC ENGINEERING METHODS FOR WATER RESOURCES DEVELOPMENT: VOLUME I, REQUIREMENTS AND GENERAL PROCEDURES,
Hydrologic Engineering Center, Davis, Calif.
L. R. Beard, A. J. Fredrich, and E. F. Hawkins.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-758 904, $6.00 in paper copy, $2.25 in microfiche. Report HEC-IHD-100, October 1971. 578 p, 31 ref.

Descriptors: *Hydrology, *International Hydrological Decade, *Computer programs, *Flood protection, Flood control, Reservoirs, Water supply, Hydroelectric power, Water resources development, Hydrograph analysis, Systems analysis.
Identifiers: *Hydrologic engineering.

Hydrologic engineering methods are presented for use in regions of sparse data. Procedures and methods are described that have been used successfully in Corps of Engineers studies or are believed to be of significant interest. Descriptions are presented of computer programs and many recently developed techniques for use in hydrologic studies. The types of water resources discussed include local flood protection, flood control by reservoirs, water supply by reservoirs, hydroelectric power developments, multipurpose reservoirs, and water resources systems. Three generalized computer programs covering different phases of hydrologic engineering are included. The first program (HEC-1, Flood Hydrograph Package) covers most types of problems generally associated with flood hydrograph analysis. HEC-2, Water-Surface Profiles, is primarily concerned with investigations related to river hydraulics problems. The third program, HEC-3, Reservoir System Analysis, deals with problems related to the planning, design, and operation of a system of reservoirs for conservation purposes. (See also W74-11232) (Knapp-USGS)
W74-11231

HYDROLOGIC ENGINEERING METHODS FOR WATER RESOURCES DEVELOPMENT: VOLUME 10. PRINCIPLES OF GROUNDWATER HYDROLOGY,
Hydrologic Engineering Center, Davis, Calif.
R. L. Cooley, J. F. Harsh, and D. C. Lewis.
Available from NTIS, Springfield, Va 22161 as AD-758 906, Price $6.00 printed copy; $2.25 microfiche. Report HEC-IHD-1000, Vol 10, April 1972. 342 p, 56 fig, 6 tab, 6 ref.

Descriptors: *Hydrogeology, *Groundwater movement, Water resources development, Finite element analysis, Computer programs, Porous media, Surface-groundwater relationships.

The fundamental concepts which govern the occurrence and movement of groundwater are described and the basic principles of hydrology, geology, hydraulics, and physics as they relate to groundwater are explained. The information is sufficient to guide hydrologic engineers in the identification and initial considerations of groundwater aspects of water resource development studies. A generalized computer program description, 'Finite Element Solution of Steady-State Potential Flow Problems,' is included. This program is intended for application to problems involving steady two-dimensional flow through heterogeneous, anisotropic porous media of any internal or external geometry. (See also W74-11231) (Knapp-USGS)
W74-11232

MARINA PROTECTIVE WAVE BREAKER,
L. C. Strawn, and V. W. Stanton, Sr.
U.S. Patent No 3,822,555, 4 p, 5 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 924, No 2, p 204, July 9, 1974.

Descriptors: *Patents, *Marinas, *Breakwaters, Equipment, Hydraulics.
Identifiers: *Wave action, *Wave breakers.

A simplified air burst wave breaker is designed for protection against wave action in Marina installations. The air burst unit comprises a duct in the form of two vertical U portions arranged with their openings toward each other, having a common leg and in which at least the bottom free leg is longer than the common leg. The lower free leg provides a water inlet stem and the upper free leg provides the air burst or burp outlet stem. The U portion opens at the bottom of an air inlet connection in the upper bend thereof. Air introduced into the air

inlet duct displaces water to an equal extent, substantially, from the inlet stem and the common leg of the U sections until air commences to enter the bottom of the outlet stem. The weight of the water in the outlet stem is reduced below the pressure of the water in the inlet stem with the result that the imbalance in pressure increases at a rapid rate and water rushes into the inlet stem to fill the entire device an in so doing, abruptly expells the air previously accumulated in a sudden gush out of the top of the outlet stem. The pressure of the air fed to the plurality of burpers forming the breakwater chain is selected to exceed the hydrostatic pressure of the water at the selected level of submersion of the burpers. (Sinha-OEIS)
W74-11412

8C. Hydraulic Machinery

FROST PROTECTION FOR WATERLINES.
Effluent and Water Treatment Journal, Vol 14, No 1, p 55, January 1974.

Descriptors: *Heat treatment, *Pipes, *Frost prevention.
Identifiers: *Heater strip, England.

A new approach to the problem of frost protection of water lines has been provided by the introduction of a self-limiting heater strip available from Chemelex Heat Ltd. The heater strip consists of an electrically insulated polymeric conductive element in contact with two electrodes which are suitable for direct connection to a power supply. The current flows from one electrode to another across the strip in a parallel circuitry configuration such that the heater strip can be cut to length on site, limited only by the maximum current rating of 10 amps per circuit. The self-limiting feature in conjunction with the parallel circuitry permits the strip to be used in any circuitry layout including wrapping over itself when tracing valves and pipe fittings. Each section of the heater strip behaves independently of any other section and adjusts its heat output according to its local temperature, which will depend on the balance between heat input and heat loss rates. These factors depend on pipe diameter, insulation grade and thickness, and variations in ambient temperature. The heater strip may be used on different pipe sizes in the same electrical circuit. (Merritt-FIRL)
W74-10910

LINEARLY DECREASING VELOCITY - WEIRS,
College of Engineering, Madras (India). Dept. of Hydraulics and Water Resources.
For primary bibliographic entry see Field 5D.
W74-10927

WATER POWER APPARATUS,
O. D. Wright.
U.S. Patent No. 3,807,890, 4 p, 8 fig, 9 ref; Official Gazette of the United States Patent Office, Vol 921, No 5, p 1994, April 30, 1974.

Descriptors: *Patents, *Water wheels, *Water utilization, Energy, Equipment, *Gates, Hydraulic gates, Spillway gates.
Identifiers: *Energy sources, *Power sources, *Water power.

The apparatus comprises a gate for directing water flowing into one side of the raceway; a power transmitting shaft is placed in a vertical position in the raceway. Paddles are mounted on and radially positioned about the shaft. A second gate is disposed at the opposite end of the raceway to perform a similar function when the water is flowing in the opposite direction through the raceway. (Sinha-OEIS)
W74-11049

METHOD OF CLEARING A PATH THROUGH ICE,
Global Marine Inc., Los Angeles, Calif.
C. E. Bastian, Jr.
U.S. Patent No. 3,808,997, 5 p, 10 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 922, No 1, p 115, May 7, 1974.

Descriptors: *Patents, *Ice, *Navigation, *Ice-water interfaces, Equipment.
Identifiers: *Ice breakup.

An icebreaking arrangement is described in which air is applied under sufficient pressure to lower the surface of the water at an ice-water interface to a level below the bottom of the ice over an area which extends on either side of the interface. The unsupported weight of the ice in the region in which the water level is depressed produced failure and breaking off of pieces of ice at the interface. The increased pressure is produced by an air-tight platform having a downward extending skirt around the periphery, air under pressure being admitted to the region below the platform. The platform may be mounted on the bow of a ship or moved ahead of a ship to clear a channel through the ice. (Sinha-OEIS)
W74-11051

PLASTIC VALVES STAND UP TO CHLORINE.
For primary bibliographic entry see Field 5F.
W74-11123

8F. Concrete

CONCRETE ARMOR UNITS FOR PROTECTION AGAINST WAVE ATTACK, REPORT OF AD HOC COMMITTEE ON ARTIFICIAL ARMOR UNITS FOR COASTAL STRUCTURES.
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-774 800, Price $4.00 printed copy; $2.25 microfiche. Miscellaneous Paper H-74-2, January 1974, R. Y. Hudson, editor. 39 p, 42 fig, 7 tab, 2 append.

Descriptors: *Coastal engineering, *Shore protection, Jetties, Breakwaters, Design, Waves(Water), Concrete structures, Design criteria, Structural shapes.

Special-shaped concrete armor units for use in the protective cover layer of rubble-mound structures exposed to storm-wave action have been developed throughout the world in the past 20 to 25 years. Quarrystone armor units may be used when available at a competitive price and when the wave conditions at the structure site are not too severe. Design information and guidance is provided for selecting the shape and size of concrete armor units for use in constructing rubble-mound structures that will be stable at a minimum cost. The factors that determine the choice of design waves are described. A stability formula and stability coefficients are given for different amounts of damage to the structure. The casting of armor units, the problems of breakage, and the legal aspects of using concrete armor units of special shape are discussed. The tetrapod, tribar, and dolos armor units should be considered for use in the design of rubble-mound breakwaters and jetties when the use of quarrystone is not feasible. The dolos armor unit is the most efficient, and procedures for the design of a typical breakwater cross section, using these armor units for the protective cover layer, are presented. (Knapp-USGS)
W74-11209

8G. Materials

FROST PROTECTION FOR WATERLINES.
For primary bibliographic entry see Field 8C.
W74-10910

EPOXY TAR LINES BIRMINGHAM'S TRUNK,
For primary bibliographic entry see Field 8A.
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THE USE OF STANDARD BODIES TO MEASURE THE CAVITATION STRENGTH OF WATER,
Minnesota Univ., Minneapolis. St. Anthony Falls Hydraulic Lab.
For primary bibliographic entry see Field 8B.
W74-11034

STEEL PIPELINE DESIGN,
Crest Engineering Co., Tulsa, Okla.
For primary bibliographic entry see Field 8A.
W74-11119

AN EMPIRICAL STUDY OF LIGHT PATH BEHAVIOR, AND APPLICATION OF THE FINDINGS TO THE DESIGN OF PRECISE SURVEYING SYSTEMS FOR DAM ALIGNMENT.
Towill, Inc., San Francisco, Calif.
For primary bibliographic entry see Field 8A.
W74-11212

PREDICTING CHELATE PERFORMANCE IN BOILERS,
For primary bibliographic entry see Field 5B.
W74-11380

8H. Rapid Excavation

PROTECTION OF THE ENVIRONMENT DURING DEMOLITION ACTIVITIES,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Weapons Effects Lab.
For primary bibliographic entry see Field 5G.
W74-11208

8I. Fisheries Engineering

CONTRIBUTIONS TO THE STUDY OF STERLET (ACIPENSER RUTHENUS RUTHENUS L.) ARTIFICIAL BREEDING: II. FRY AND FINGERLING FEEDING IN BASINS WITH CIRCULAR WATER FLOW, (IN RUMANIAN),
H. Fuhrmann, E. Fuhrmann, S. Dragasanu, and A. Cristea.
Bul Cercet Piscic. Vol 31, No 1/2, p 101-122. 1972. Illus. English summary.

Descriptors: *Fry, Fish diets.

In 1971 a breeding station was set up to produce fish for stocking the Danube in the section upstream from the Iron Gates dam (Romania). This was the first opportunity for obtaining and breeding sterlet fry. Two possibilities existed to apply methods used in sturgeon feeding. Good results were obtained in feeding fry with Enchytraeidae, Artemia salina and Chironomidae. To improve fodder consumption as well as to make possible the use of chironomids too large to be eaten as such, the following mixture was employed: 30% minced chironomids, 25% chrysalid meal, 15% fish meal, 8% meat and bone meal, 2% dried yeast and 20% water. The chironomid proportion may be diminished as the fry are accustomed to the artificial food. The coagulated fresh blood with a high protein and essential amino-acid content comparable to the most important natural food elements was consumed. Fingerling growth rate is given. The inactivated zooplankton and the fresh blood serve to improve the quality of food.--Copyright 1974, Biological Abstracts, Inc.
W74-11156

RESTORATION OF AN OYSTER RESOURCE DESTROYED BY NATURAL CAUSES,
Alabama Dept. of Conservation and Natural Resources, Montgomery.
E. May.
Available from the National Technical Information Service, Springfield, Va 22161 as COM-73-11130, $3.00 in paper copy, $2.25 in microfiche. Completion Report NOAA-73052112, July 1972. 4 p, 1 fig.

Descriptors: *Anaerobic conditions, *Oysters, *Planting management, Fish, Shellfish, Fishkill, Dissolved oxygen, Fisheries.
Identifiers: Mobile Bay(AL).

A naturally occurring area of low dissolved oxygen concentration, discovered on August 4, 1971 in Pt. Clear Reef in Mobile Bay, Alabama resulted in a fish kill estimated at 10,588,705 fish, shrimp and crab. The anaerobic condition was not the result of water pollution as this episode has recurred in this area for more than 100 years but rarely resulted in fish kills. The August 1971 period of low oxygen in the bottom waters caused a 95% mortality of the oysters. In order to replace the lost resource, cultch material was planted in a more suitable area in the vicinity, on a portion of Whitehouse Reef. This reef had not been productive because of the lack of cultch material, however it contains a firm bottom and the area has shown no problem with low dissolved oxygen or pollution. Approximately 439 barrels of marsh clam shells were planted per acre on 253.4 acres of the area by the Alabama Department of Conservation and Natural Resources and the site is expected to yield seed oysters and commercial harvest. (Auen-Wisconsin)
W74-11163

CONNECTICUT RIVER ECOLOGICAL STUDY--A STUDY OF THE RATE AND PATTERN OF SHAD MIGRATION IN THE CONNECTICUT RIVER--UTILIZING SONIC TRACKING APPARATUS,
McGill Univ., Montreal (Quebec). Dept. of Biology.
W. C. Leggett, and R. A. Jones.
Available from NTIS, Springfield, Va 22161 as COM-73-11043, Price $3.00 printed copy; $2.25 microfiche. Essex Marine Laboratory Report No 5, February 1973. 118 p, 32 fig, 7 tab, 18 ref.

Descriptors: *Fish migration, *Connecticut River, Fish barriers, Connecticut, Salinity, Saline water-freshwater interfaces, Fisheries.
Identifiers: *Shad, Commercial fisheries.

The rates and patterns of movement of adult shad in the Connecticut River were determined with particular reference to the important commercial fishing area located in the lower 45 km of the river, the heated water discharge are of the Connecticut Yankee Atomic Power Company's powerplant at Haddam Neck, and in the nonchanneled area of the river north of Hartford. Two hundred and thirty shad were fitted with ultrasonic tags; 27 in 1967, 115 in 1968, and 88 in 1969. The migration is complex in nature, with considerable deviation from a straight line, continuous upriver migration. Soon after entering the river from the sea, shad begin to experience the effects of rapid reductions in salinity. These changes in the physical environment are reflected in greatly reduced swim speeds and prolonged meandering at the region of the salt-freshwater interface. Shad are very vulnerable at this stage in the migration, being both weakened and, presumably, concentrated because of the barrier effect of the interface which impedes their progress for up to 70 or more hr. Once through the salt-freshwater interface and fully freshwater-adapted, the migrations become more vigorous and more direct. Shad favor the channeled areas of the river; this has considerable importance with respect to the situating of industrial intake and discharge structures in relation to the river channels. (Knapp-USGS)
W74-11227

KENTUCKY LAKE COMMERCIAL CATFISH CATCH ANALYSIS,
Murray State Univ., Ky. Biological Station.
P. J. Matthai.
Available from NTIS, Springfield, Va., 22161, as COM-73-11185, Price $3.50 printed copy; $2.25 microfiche. Kentucky Department of Fish and Wildlife Resources, Frankfort, Project Report 4-70-R, June 30, 1972. 51 p, 3 fig, 24 tab, 7 ref.

Descriptors: *Catfishes, *Kentucky, *Commercial fish, Fish harvest, Fish populations, Lake fisheries, Creel census.
Identifiers: *Kentucky Lake(KY), Blue catfish.

The total catch of fish from Kentucky Lake of commercial fishermen was studied as the fish were caught. Age, growth, and condition of blue and channel catfish were compared with previous data. A total of 497 bait lines captured 3595 fish of 14 species in 1970-71, and 531 lines captured 4611 fish of 13 species in 1971-72. Blue and channel catfish constituted 92 to 95% of the total catch. A total of 141 gill nets captured 401 fish of 11 species during the first year, and 155 gill nets yielded 453 fish of 11 species during the second. Percentage compositions of the five most numerous species in 1970-71 were: buffalofishes, 42%; blue catfish, 15%; carp and freshwater drum 13% each; and paddlefish, 11%. Comparatively, the compositions in 1971-72 were: buffalofishes, 41%; paddlefish, 20%; carp, 15%; blue catfish, 8%; and freshwater drum, 6%. Comparison of calculated weights of the two species between 10 and 20 inches inclusive shows that blue catfish attainments exceeded those of channel catfish by 8%. Channel catfish condition indices exhibited a slow decline from 32.4 to 30.8, while those of the blue channel catfish were experiencing some degree of retardation, whereas the blue catfish experienced little or no impairment. Comparison with average seven-year length attainments computed for previous surveys indicated that average attainment by channel catfish of the present survey was approximately 4% below that of the preceding study in Kentucky Lake, Kentucky; 26% above that of the Kentucky Lake, Tennessee, study; and 3% below those of both the Norris Reservoir and Watts Bar surveys. (Knapp-USGS)
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CENTERS OF COMPETENCE AND THEIR SUBJECT COVERAGE

- Ground and surface water hydrology at the Water Resources Division of the U. S. Geological Survey, U. S. Department of the Interior.
- Metropolitan water resources planning and management at the Center for Urban and Regional Studies of University of North Carolina.
- Eastern United States water law at the College of Law of the University of Florida.
- Policy models of water resources systems at the Department of Water Resources Engineering of Cornell University.
- Water resources economics at the Water Resources Center of the University of Wisconsin.
- Eutrophication at the Water Resources Center of the University of Wisconsin.
- Water resources of arid lands at the Office of Arid Lands Studies of the University of Arizona.
- Water well construction technology at the National Water Well Association.
- Water-related aspects of nuclear radiation and safety at the Oak Ridge National Laboratory.
- Water resource aspects of the pulp and paper industry at the Institute of Paper Chemistry.

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- Effect on water quality of irrigation return flows at the Department of Agricultural Engineering of Colorado State University.
- Agricultural livestock waste at East Central State College, Oklahoma.
- Municipal wastewater treatment technology at the Franklin Institute Research Laboratories.

Subject Fields

1 NATURE OF WATER

2 WATER CYCLE

3 WATER SUPPLY AUGMENTATION AND CONSERVATION

4 WATER QUANTITY MANAGEMENT AND CONTROL

5 WATER QUALITY MANAGEMENT AND PROTECTION

6 WATER RESOURCES PLANNING

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